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THE IRON AGE

A Review of the Hardware, Iron, Machinery and Metal Trades.

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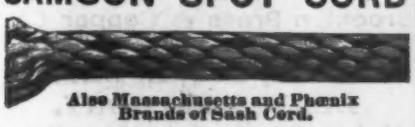
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SEE PAGE 27.

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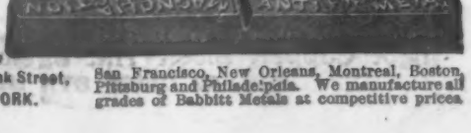
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For sale by David Williams Co., 232 William St., N.Y.

THE IRON AGE

THURSDAY, DECEMBER 10, 1903.

A Farrel Motor Driven Alligator Shear.

There has recently been built for the Norfolk (Va.) Navy Yard an alligator shear, certain of whose features were arranged in accordance with specifications of the United States Navy Department. While in certain respects varying from the standard practice of its makers in order to meet the requirement of the Government's specifications, the shear embodies the general features of a redesigned line of machines of this class, built in eight sizes and arranged for either motor, engine or belt driving. The machine shown is representative of the size designated as No. 7 of the regular line, designed for a capacity equivalent to that of cutting cold a bar of upon the motor armature shaft, is of raw hide, meshing with a cut iron gear upon the intermediate shaft directly below it. The second reduction gears are a semi-steel machine molded pair, located at the opposite side of the shear, as seen in Fig. 2. The gearing ratio for the double reduction is 54 to 1, the motor speed being such as to give 17 cuts per minute at the shear blades. The fly wheel is mounted upon the intermediate shaft, outside the pinion of the second reduction gear pair, as shown in Fig. 2.

The shear lever is actuated by crank action, the cranked portion of the main shaft working against the under side of the lever and within a space formed by the attachment of a yoke casting to the lever, as plainly seen

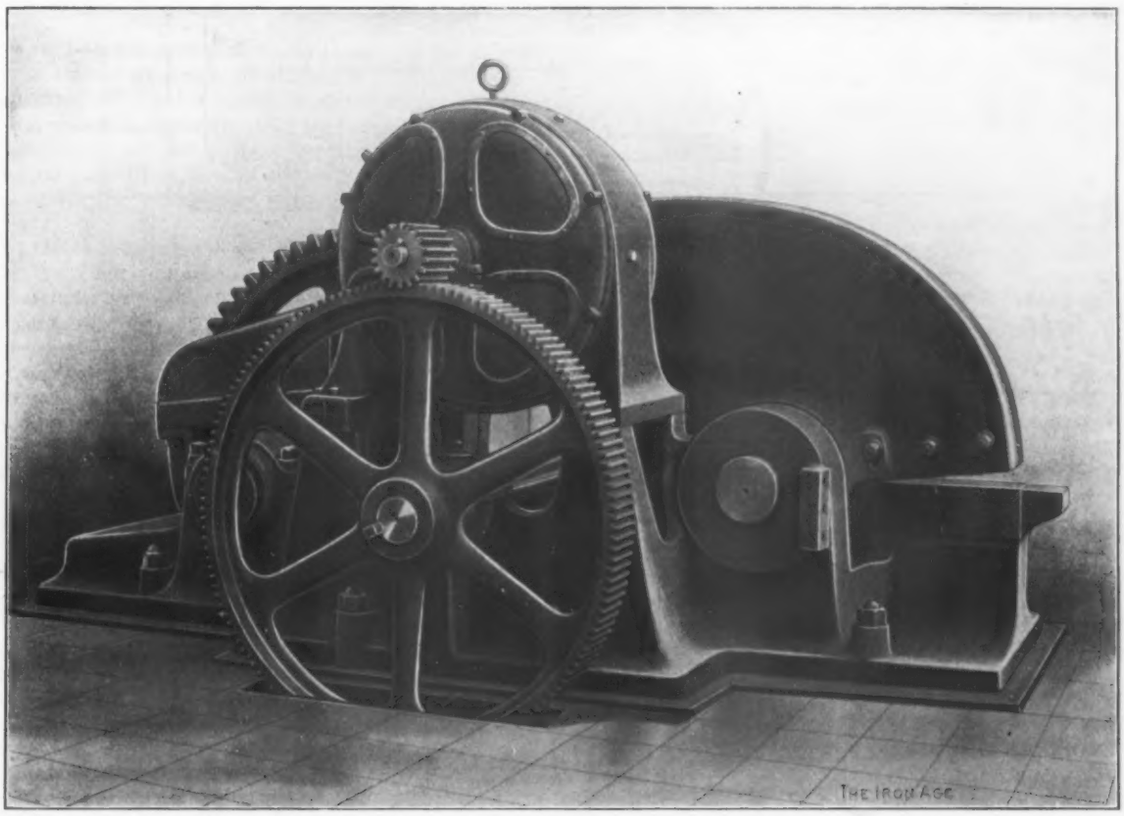


Fig. 1.—Left Side View Showing Motor Mounting.

A FARREL MOTOR DRIVEN ALLIGATOR SHEAR.

3-inch square wrought iron. The mounting and connection of the motor are evident from Fig. 1, which gives a good view of the left hand side of the machine. In Fig. 2 the shear is shown in plan and elevation, with foundation dimensions. From the latter illustration it appears that the extreme floor space, measured at the foundation, is included within a length of 11 feet 6 inches and a breadth of 5 feet 8 inches. The over all breadth exceeds this amount by the overhang of the gears at each side, bringing the total to about 7 feet.

The adaptability of the machine to other than motor driving is evident from the illustration, since it may readily be understood that upon the pedestal supporting the motor in the present case may be mounted a steam engine, or the stands carrying a belt pulley and its shaft. In either instance the shaft hight may simply be made the same as that for the motor, when the same driving pinion may be used. This driving pinion, mounted here in Fig. 2. The direction of rotation of the motor is such that the main gear turns over to the left, Fig. 2, thus causing the crank to exert its lifting force upon the shear lever at the outer or right hand end. This gives it the maximum leverage and also quickens, the jaw opening as the crank descends to the left. Pressure of the main shaft is evidently downward in its bearings during the working portion of its rotation, both from the action of the driving pinion on the intermediate shaft and the resistance of the lever arm to the rise of the crank.

The shear blades are 18 inches long, and, of course, are readily removable. The stripper jaw or arm, clearly shown in Fig. 2, is arranged to admit beneath it work of any thickness within the capacity of the shear. The castings of the machine are stated to be of semisteel throughout, and the weight complete, as shown in Fig. 1, is given as about 24,000 pounds. The makers of this

shear and of the line from which it is a slight variation are the Farrel Foundry & Machine Company, Ansonia, Conn.

Danville-Bessemer Steel Company Dissolved.

The Danville-Bessemer Steel Company, with offices at 13 South Water street, Philadelphia, Pa., and a plant at Danville, was dissolved December 3 by vote of the stockholders at a meeting in Camden, N. J., and the officers were authorized to dispose of the plant to the best advantage. This action was taken notwithstanding earnest protests of minority stockholders, who demanded an investigation into the way business had been conducted.

According to the officers and directors, the reason for winding up the affairs of the company is that the concern have been doing a losing business, which has latterly been confined to the manufacture of shovels.

Attorneys Alfred C. Bruner of Columbus and Sidney E. Smith of Philadelphia, who represented minority shareholders, declared that extravagance was the cause of the company's failure, and asked for an investigation.

This steel company were one of the numerous concerns, some of their stockholders say, which arose on the high tide of speculation a few years ago. In one of their business operations they came into contact with the ill fated Consolidated Lake Superior Company, selling to Lake Superior a Bessemer steel outfit which was part of their plant. The plant at Danville, which was purchased in 1898, consisted then of a blast furnace, rolling mill and steel plant. A shovel plant was afterward built, at a cost of about $100,000. The company were capitalized at $1,200,000, all of which was paid in. After the sale of the steel making apparatus to the Lake Superior, $1 a share, or $240,000 of the stock, was returned to the holders. Later the capital was reduced to $360,000, and $600,000, or one-half of the original capital, was wiped out. This was done, so the management said at the time, to save something in taxes on the capital stock.

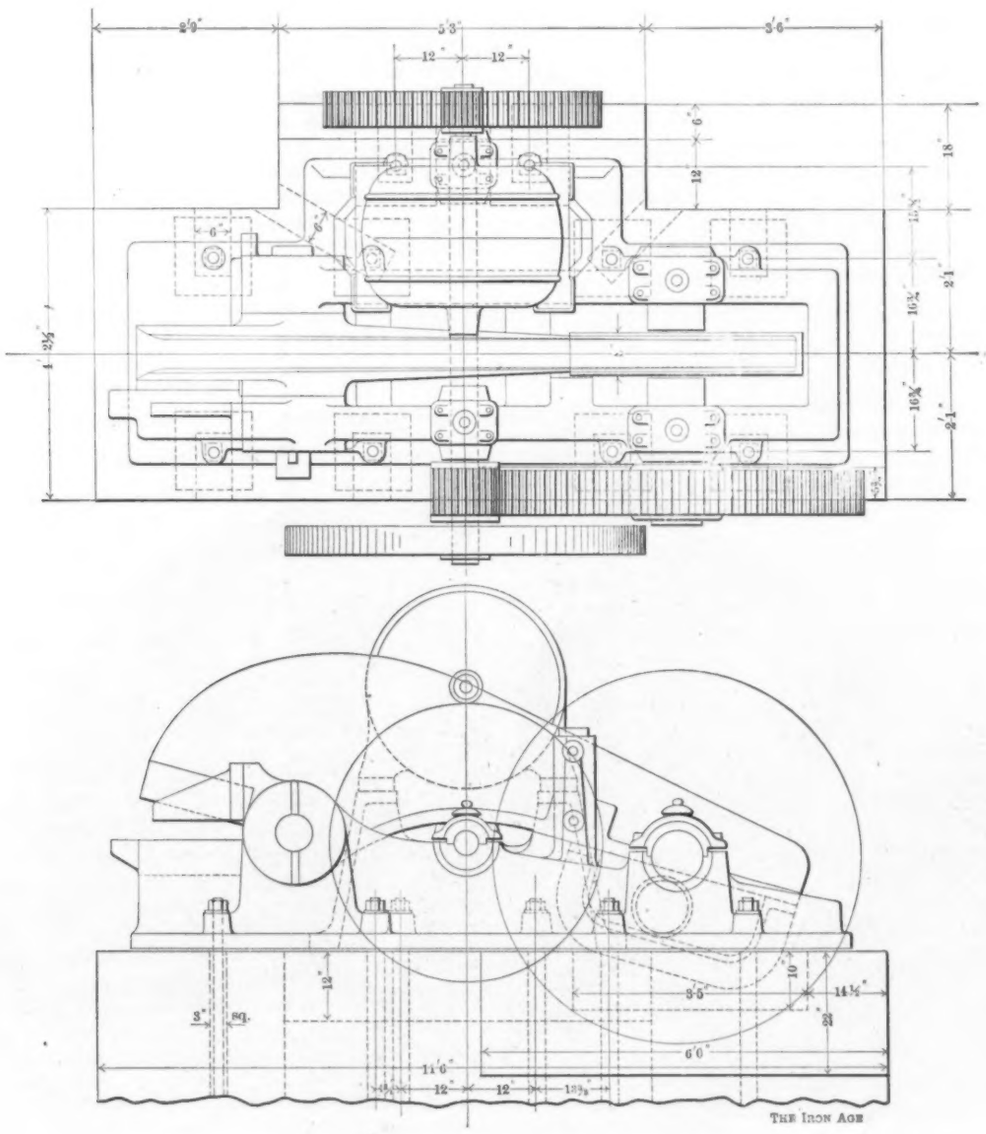


Fig. 2.—Plan and Elevation, Showing Foundation.

A FARREL MOTOR DRIVEN ALLIGATOR SHEAR.

Since the meeting a suit has been filed against the promoters, Colonel A. Loudon Snowden, president of the Fairmount Park Commission; ex-State Senator Charles A. Porter, C. Kennedy Crosson, a contractor, and Frank Samuel, and Annie C. Filbert, Richard Y. Filbert, Laura C. Day and Horatio N. Day, as executors of the will of the late Ludwig S. Filbert, by John J. McCloskey and Louis A. Levin, two stockholders. In the bill the Court is asked to compel the defendants to make known the profit they made in the sale of the plant to the company; the persons receiving the profits and the amounts; to return the profits into the company's treasury, and, if necessary, appoint a receiver.

What is stated to have been the longest drought ever known in the Southwest was broken on December 1. The drought lasted 82 days at New Orleans, but in the interior of the Southwest it lasted 120 days, causing damage to crops and heavy losses from forest and field fires.

Scotch and Western England Notes.

The Scotch Steel Trade.

GLASGOW, November 26, 1903.—Scotch steel makers are fairly well employed on contracts, but are getting rather anxious as to the future. Prices are easier, but not quotably lower. Malleable iron makers are not well employed, and most of the works are on short time. Pipe founders are busy, and so, as a rule, are tube makers, but the business is somewhat irregular.

There is a proposal just now for a working alliance, which may end in a combine, between the recently formed combine of Stewarts & Lloyds, Limited, of Glasgow and Birmingham, and the Wilsons & Union Tube Company, Limited, of Glasgow. The idea is for Stewarts & Lloyds to guarantee a fixed dividend to Wilsons & Union on condition of having the control of the management of the latter through their nominees on the Board of Directors. By regulating prices and eliminating competition it is expected that large average profits can be earned for both concerns. But a section of the shareholders of Wilsons & Union is opposed to the surrender of independence of the company and is going to fight the matter out.

The suggested combine of Scotch steel makers as yet shows no visible sign of materialization. The engineering industry here is not brisk, apart from marine engineering, which is naturally depressed by the depression in shipbuilding, yet the pattern makers have made an ill advised and ill timed demand for an advance in wages, which the engineering employers have naturally declined.

There have been reports of a decline in the locomotive industry here, but on inquiry I find it is really in a fairly good condition at present. A number of men were recently paid off at Hyde Park works, but these were chiefly emergency men, who had been taken on for the purpose of hastening the completion of an order for Canadian engines, which had to be delivered before the closing of the St. Lawrence. Both the Atlas and Hyde Park shops continue to work night and day shifts, and the drawing offices of both places have been working overtime for some weeks past. The work arranged for extends to the end of March.

While orders are not so plentiful as they have been, the North British locomotive combine have secured a large number of contracts for engines during the past week or two, including 25 for the Soudan. At the North British Railway Company's shops there is generally a slackening off in the early part of the winter season to five days per week, but there is no indication of that course being followed this year. In the Caledonian Railway works at St. Rollox, however, that company have reduced the number of hands and curtailed the number of days worked, but this is only a temporary reduction.

The West Coast of England.

In the Barrow district the demand for hematite pig iron remains quiet. Stocks in makers' hands have not been reduced, and they still represent a large bulk. Prices are slightly lower on the week, and there is less life in the steel trade. The demand for heavy rails is quieter, but fair orders are held for tram sections for several British towns. Heavy rails are £5 5s. per ton, the combine price, although there is a disposition toward lower rates owing to the keen competition experienced from the Continent. Ship plates are quiet at £5 12s. 6d., and the mills are working irregular time. Orders are held for local use and for Belfast shipyards. Other classes of steel are quiet.

In the northwest district the iron market remains slow. Business is from hand to mouth and orders are keenly competed for. Although no transactions of any great weight have been put through there is no doubt about American pig iron coming over, and business has been done during the past week on the basis of about 50 shillings, c.i.f. Manchester, and 48 shillings 6 pence c.i.f. Liverpool.

There is nothing new to report of the finished iron trade. **Forges** with a small output are able to keep going, but **have very** little booked ahead; larger works are running short time and booking few new orders. Both American and German competition is making itself felt in the steel trade, and has a weakening effect upon prices. For English billets quotations range from £4 10s. up to £4 12s. 6d., and £4 13s. 6d. by local makers, with German billets offering from £4 4s. to £4 4s. 6d. for 4-inch, upward to £4 5s. and £4 5s. 6d. for 2-inch and upward, and American billets reported about £4 2s. 6d.

Consumers expect to buy billets before the close of the year at about £4 per ton. In American sheet bars transactions are reported at about £4, c.i.f. Liverpool, a figure which is cutting out German competition. Common plates for structural purposes are offered by German houses at prices considerably below English quotations, which remain about £6 to £6 2s. 6d. for common plates delivered. Steel boiler plates remain nominally £6 12s. 6d. delivered, but owing to the extreme quietude in the boiler-making trade there is very little business doing.

The following is a summary of British iron and steel exports and imports for the ten months ended October 31:

	1903. Gross tons.	1902. Gross tons.
Exports	3,168,625	2,898,636
Imports	968,020	886,119
Imports of iron ore	5,375,922	5,315,185
		B. T.

The Ohio Works and Blast Furnaces of Carnegie Steel Company.

In a recent issue of the *Daily Times*, Youngstown, Ohio, appeared an illustrated article describing the blast furnace and Bessemer plant of the Ohio Works of the Carnegie Steel Company at Youngstown. We take from the article the following interesting data regarding the output of the three blast furnaces and Bessemer steel plant:

"No. 1 furnace at this plant was blown in February 14, 1900, and from that date to November 1, 1903, the three furnaces produced 1,588,323 tons. During this period No. 1 furnace was off for relining from April 30, 1903, to July 24, 1903. No. 2 furnace was off for relining from August 17, 1903, to November 1, 1903. No. 3 furnace was off for relining from July 22, 1902, to September 24, 1902. Produced on lining, No. 1 furnace, from February 14, 1900, to April 30, 1903, 572,045 tons; average per day, 490 tons. No. 2 furnace, first lining, June 6, 1900, to August 17, 1903, 565,995 tons; average per day, 486 tons. No. 3 furnace, first lining, 221,417 tons; average per day, 460 tons. The best year's work of furnaces was 1902, when 525,982 tons were produced, with No. 3 furnace out of blast for over two months. In order to produce the 1,588,323 tons concluding with November 1, 1903, the following materials were required: Ore and scale, 2,894,256 tons; coke, 1,501,020 tons; limestone, 682,062 tons.

"Records—The best record for a single month was December, 1901, when furnace No. 2 established a world's record for single furnace in turning out 19,645 tons. In March, 1902, No. 1 furnace reached a new monthly record of 19,734 tons. January 19, 1902, No. 1, No. 2 and No. 3 combined produced 1973 tons. The best week's run for the three furnaces was 12,511 tons. Production of finished steel from February 14, 1895, to October 1, 1903, was 3,354,917 tons. In 1901 the finished product was 459,700 tons; in 1902 the output was increased to 575,131 tons. In 1901 562,572 tons of ingots were produced, and in 1902 685,609 tons of ingots were turned out.

"Material Received—1901, 1,905,588 tons; 1902, 2,217,102 tons.

"Material Shipped—1901, 533,165 tons; 1902, 605,288 tons.

"Total Handled—1901, 2,438,753 tons; 1902, 2,822,390 tons.

"Car Record—Inbound: 1901, loads, 67,878; empties, 12,930; total, 80,808; daily average, 221. 1902, loads, 78,605; empties, 13,333; total, 91,938; daily average, 252.

"The converting department record was established June 10, 1903, 270 heats being made and 2861 tons turned out."

The Ohio Works consist of three blast furnaces, while

a fourth stack is building; two 10-ton converters, blooming mill, billet mills and rail finishing department. The output consists of pig iron, steel rails, billets, sheet and tin bars.

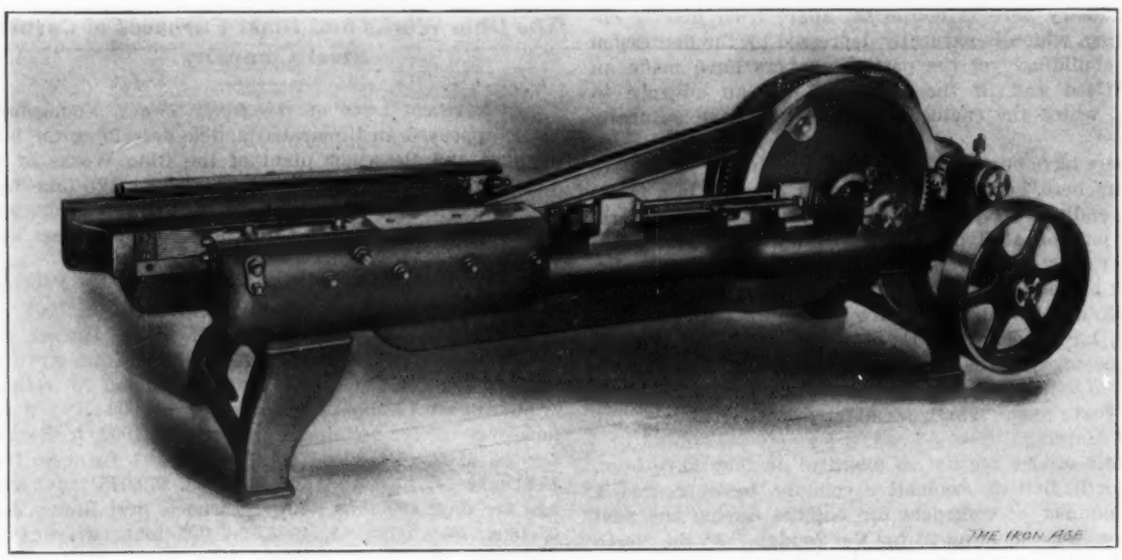
Blake & Johnson Thread Rolling Machine.

Embodied in the improved thread rolling machine here shown are several special features, among the more prominent of which are a central load line instead of an overhung one; a readjustment of the so-called trolley track into its true relation to the maximum load of the machine while at its point of highest duty; adoption of the box pattern for the main frame, insuring increased rigidity with reduced weight and allowing the erection of the larger machines upon ordinary floors, instead of requiring to be placed upon ground floors and special foundations. The development of the principle of thread rolling and of satisfactory machines for its accomplishment has covered a long period of years in the practice of the makers of the present machine and the improvements noted are such as have been dictated by experience with machines of their previous design. Various features have been improved from time to time, until now the machine here illustrated is brought forth as the realization of the good and the elimination of the unsatisfactory in previous designs. It is stated that with these improved machines there is no difficulty in rolling a practically true thread upon rough stock, the rolled thread being perfect except for such imperfections in the stock itself as may prevent perfection in the thread at certain spots. The main portion of the thread being true, local imperfections cannot detract materially from its practical usefulness, the whole being stated as coming much closer to accuracy than would be the case were the thread cut by ordinary bolt machines. It is said that when threads are rolled the burr commonly left by a cutting tool is eliminated, there being no removal of stock, but merely a smooth rolling action forming the thread by deforming or upsetting the metal.

In producing screw threads by rolling, past experience has dictated that absolute rigidity is essential to perfect success, and the design of the machine, of which an example is here shown, has been carried out with this requirement in mind. Careful observation of the performance of the older machines showed that the slightest variations in the slides and ways under the influences of actual work were transmitted to the rolled thread. To overcome this effect, removal of its cause was sought, and the trouble was eliminated by the introduction of the so-called "trolley" arrangement of the moving die head and guides, the construction involving the use of hardened and ground tool steel rolls running between hardened and ground tool steel plates. This construction also quite naturally effected a reduction of friction between the reciprocating die head and the guide. The practical elimination of friction at this point is said to be very marked, particularly in the larger machines, where the reduction is, of course, most noticeable.

The adoption of the "trolley" principle apparently eliminated the difficulties previously experienced, but the effects of long usage still showed themselves in much the same way after long periods of service, and the only remaining cause of undue wear was removed by centralizing the working load line. This done, the necessity for redressing of the guides, even at long intervals, was removed, as the eccentricity of force application was replaced by the direct action of the new design.

The last undesirable feature of the older designs was removed when a slot, of width suited to the maximum diameter of work for each machine, was cast in the main frame directly beneath the dies, and a stripper was attached to the reciprocating die head. Then at each cycle of the machine, corresponding to the production of one screw, the scale dropping from the work was removed and the working surface of the slide kept free. This feature prevented the accumulation of dust and scales from the rough stock and stopped the cutting action which had previously caused excessive wear.



BLAKE & JOHNSON IMPROVED THREAD ROLLING MACHINE.

Referring to the illustration, power is delivered by belt to the fly wheel pulley shaft at the extreme rear of the machine. Double reduction gearing, through the intermediate shaft seen above the fly wheel shaft, brings the rotative speed of the main crank disks down to that corresponding to a proper reciprocation of the movable die head, actuated by connecting rod, as clearly shown. Each rotation of the crank disk gears represents the production of a complete thread by a double reciprocation of the die. Convenient means for making all necessary adjustments and interchanges are provided. Five sizes of the machine are regularly built, the largest being that shown in the illustration, designed to roll all styles of machine screw threads up to 1⅛ inches in diameter and of a maximum length of 3½ inches. The smallest size, No. 1, is for threads up to 3-16 inch in diameter, and the sizes intermediate between this and the largest are of capacities so overlapping each other as to offer the most convenient arrangement. The largest size is stated to be adapted to rolling threads upon railway track bolts, and similar work of a generally heavy nature. It is said that dies may readily be made to roll equally well the United States standard, the Whitworth, the Harvey "grip," the straight "V," or any other thread of similar nature.

An interesting point in connection with these machines and the principle of thread rolling in general is that with one of these machines were formed the threads

used in splicing end to end the wires making up the cables of the new East River bridge, now ready for traffic between New York City and the Williamsburg district of Brooklyn. The component wires of these cables are of high carbon steel, about 3-16 inch in diameter. In splicing them, where necessary, the meeting ends were threaded and united by a long, thin sleeve nut. The threads were necessarily fine and the sleeves long, great accuracy being requisite for work of this important character. It is stated that sufficient accuracy was impracticable with cutting dies, as the nature of the steel in the wires was such that uniformity was impossible, since the dies would endure for cutting only about ten such threads. This difficulty is said to have been avoided by use of the rolling principle as embodied in the machines just described, the splices meeting all the requirements for accuracy and strength.

The machines are built by Blake & Johnson, Waterbury, Conn., who have developed them, as already outlined, in connection with their regular business of manufacturing screws and bolts, as well as other similar details of machine and engineering construction.

A New Standard Reynolds-Corliss Engine.

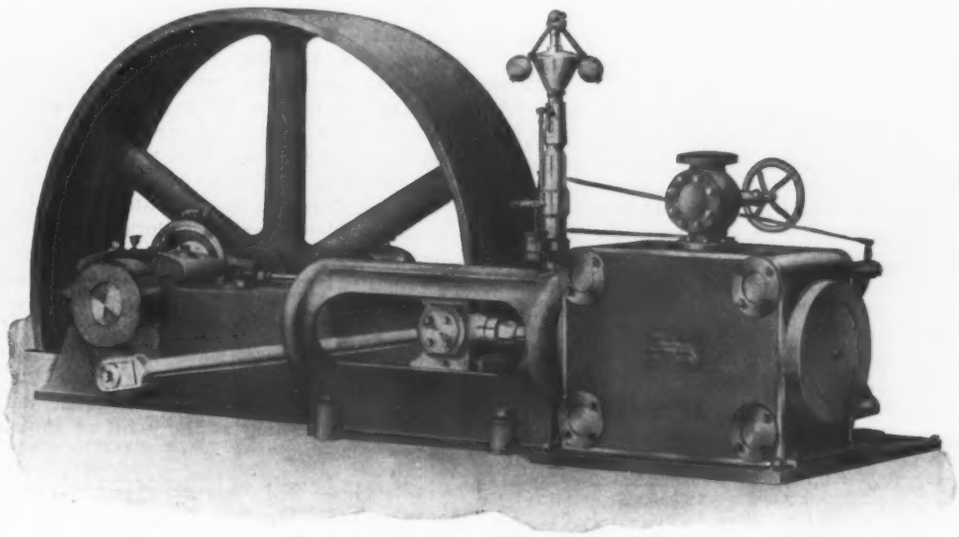
The field of Corliss engine design has been so fully worked over in the past, and the accepted standards have become so simple, that no strikingly novel variations are to be expected. The Allis-Chalmers Company, however, are now bringing out a new engine from the designs of Irving H. Reynolds, until recently chief engineer of that corporation. This new machine is planned to combine the desirable elements of the best designs, as represented by 26 years of experience in Corliss engine building, and is intended to become the standard engine of its type built by this company. It is made in seven sizes, ranging from 50 to 500 horse-power, and adapted to steam pressures up to 150 pounds. Lengths of stroke are somewhat less than have heretofore been customary, the idea being to effect economy of space and rigidity of construction. Rotative speeds, on the other hand, are increased slightly, ranging from 110 to 150 revolutions per minute, although these speeds are not higher than those at which the Reynolds-Corliss engines of older design are frequently operated.

The frame is cast in one piece with the slide, the construction being of the box type, resting on the foundation for its entire length. The main bearing shells are bored into the frame, thus insuring a solid bearing and also permitting the easy removal of the shells by rolling them out around the shaft. The slide is of the barrel type with bored guides. The cross head is fitted with babbitt faced shoes with wedge adjustment. The piston rod is screwed into the cross head and held firmly with a steel lock nut. The cylinder is of the round cornered type, is fitted with double ported steam and exhaust valves, and is lagged with planished steel. The cylinder is set on a cast iron base plate, which extends under the valve gear, serving as a drip pan.

The valve gear is of the usual Reynolds-Corliss type, the wrist plate being of skeleton pattern and fitted with a new type of disconnecting device, which, while clamping the hook rod firmly, is very easily detached by hand. The dash pots are of the differential plunger type, without leathers or packing of any kind. The regulator is of the high speed weighted pattern, designed to control the engine within narrow limits of speed variation.

The connecting rod is of steel, with solid forged ends, fitted with bronze boxes, and babbitt lined on the crank pin ends, the boxes being adjustable by means of screw actuated wedges. The crank is of plain type, polished on the face, and is protected by a planished steel oil guard, not shown in the illustration. The engines are fitted either with belt fly wheels, as shown, or with square rim wheels, where used with direct connected electric generators. The crank and cross head pins and main journals are of sizes ordinarily used with heavy duty engines.

The builders characterize the engine as a strong, simple and compact machine from which, while nothing has been added for ornamentation, nothing contributing to economy or durability has been omitted. Such being the case, it is expected that the new engine will fill an important place within its field of applicability



A NEW STANDARD REYNOLDS-CORLISS ENGINE.

An instance of where brute strength triumphs with the modern wire drawer as a wage earning factor, as compared with the skill of the old time wire drawer, who had to make his own dies as well as draw his wire, is shown in the case of the champion of the Worcester Works of the American Steel & Wire Company, who draws 10,000 pounds of three draft wire a day. This man is a Finlander of enormous strength and endurance. To draw 10,000 pounds of wire means to lift 40,000 pounds a day, 200 pounds at a time. The wire is drawn from No. 5 to No. 12½. He must lift the rod on the reel, then lift the coil off the block on the reel, for the second draft; repeat this operation and finally lift the coil off the block on a barrow. This is heavy work and few men are strong enough to endure it. Many men handle greater tonnage, for example, in these same works where men shovel coal from cars at 7 cents a ton and earn $2 a day, which means that they handle close to 30 tons a day, or 60,000 pounds, as against the wire drawer's 40,000 pounds. But they do not handle the coal in 200-pound lumps, and the strain is not so great.

The Magnitude of the Coal Industry.*

The story of coal mining and distribution is a wonder story. In every country there is something wonderful in regard to it, but nowhere else is this so true as in the United States. Within a few years the production has grown to figures which were deemed out of reach by persons in official position who made estimates only two decades since. We now occupy first place in point of output of coal in the world; we have distanced Great Britain and do twice as much as Germany, the third country in the list. One hears much of the anthracite trade in this country because the interest is concentrated and it is a domestic fuel, but it is nothing to be compared with the bituminous trade of the country, the tonnage of which will reach four times that of anthracite during the year 1903.

The production of coal in the United States amounted to something like 300,000,000 net tons last year, of which 37,000,000 tons was anthracite. In spite of the larger output of anthracite this year the bituminous holds its own, or within 5 per cent. The particular fact worthy of mention, perhaps, is that of our large home consumption. While Great Britain does a tonnage closely approaching that of this country, about 54,000,000 tons of her tonnage is exported. Our business is shown by the shipment of about 7,000,000 tons annually of all grades.

A recent Government report showed the progress made in coal produced in the United States at decennial years from 1850 to 1900 to be as follows:

Calender year.	Tons of 2,240 pounds.
1850	3,358,899
1860	8,513,123
1870	32,863,000
1880	63,822,830
1890	140,866,931
1900	240,788,238

The total output of coal in the world is put at something over 855,000,000 net tons, and the three great countries are the United States, with 295,124,793 tons; Great Britain, with 246,942,985 tons, and Germany, with 150,742,267 tons. Great Britain, United States, Germany—the three Anglo-Saxon countries and the seat of intelligence, where industries are greatest; The Latins do not produce or consume coal to any like degree.

The growth in the production of bituminous coal in this country has been developed along the following lines:

	1869.	1879.	1902.
South	2,785,505	6,093,693	62,383,142
West	5,608,392	18,599,823	95,707,989
Pennsylvania	7,798,518	18,004,988	98,946,203

Phenomenal has been the growth in the tonnage from the States south of the old Mason-Dixon line. There the output has grown from 2,785,505 tons in the census year of 1869 to 62,383,142 tons in 1902, and the end does not yet appear, for the number of operations has nowhere multiplied so greatly in recent years as in West Virginia, Tennessee, Kentucky and Alabama. The facilities for mining are the simplest, for the coal is above water-level, and the great railroad systems are only too ready to offer every opportunity for the development of the vast areas of coal land; in fact, it is stated that the one State of West Virginia contains a larger extent of coal than does Great Britain.

American mining is carried on so largely by drift mining at present that it is a marvel to the foreigner to find how cheaply, in a comparative sense at least, the coal is put on the railroad cars at the mine tipple. Abroad, the mine owner sometimes must go to a depth of 2000 feet for his thin seam of coal, while in this country the drift into the side of a hill, on a seam of coal running up to 10 feet or more, is in no sense unusual. Shafts in some of the Western coal fields are usual, but are not beyond a couple of hundred feet in depth, as a rule; they find seams up to 5 and 6 feet, and this is sold at very low prices, for the tonnage is dealt with in large quantity. There are slopes in the South to somewhat thinner seams, and the use of electric machines for cutting, transporting and hoisting give some cheap results; one mine in Alabama recently turned out 1663 tons in a day.

Anthracite mining is by shaft or slope, and within a few days it is learned that the Reading Company are to sink one of their shafts to a depth of 1050 feet—it is now 900 feet—and four valuable coal seams have already been cut. Mr. Baer tells us that the cost of labor in producing a ton of hard coal has increased steadily in recent years. In 1866 it was 60 cents per ton; in 1900, $1.12 per ton, and in 1901, $1.29 per ton, and before the increase of 10 per cent. in wages in 1902 it rose to $1.37. The present cost of labor per ton of coal mined is unofficially stated to be about $1.50 per ton, and this on all the coal—large and small.

It is well to remember that not all coal mined is shipped; 6 per cent. of the soft coal and 12 per cent. of the anthracite is used at and about the mines for steam raising, or for local uses. Of the bituminous coal shipped to market, about one-half is used for railroad and steamship supply, and coke took up 39,600,000 tons last year.

Our foreign trade, apart from the countries north and south of us, has not amounted to much in recent years. We were doing something in 1901, and then came the higher figures, due to our industrial activity and other causes. Now that prices of bituminous coal have been reduced to something like normal figures, there is again opening up the possibility of entering in at places in competition with British coal; what we need is vessels to carry it at a fair rate of freight, and then we can accomplish another feat in the long list of American invasions. One thing that is eminently satisfactory is the fact that the American Navy, no matter in what part of the world it is located, now has its furnaces fed with the product of American mines. The necessity of this was fully shown in the recent Spanish-American War; the trip of the famous battle ship "Oregon," from the Pacific to the Atlantic, was made on all sorts of coal picked up on the way at very high prices, but her engineer made the best of time after he got some Virginia coal.

Pennsylvania is the only State wherein both grades of coal are mined, barring Colorado, which has turned out less than 100,000 tons of so-called anthracite.

Coal is carried by rail great distances, from its point of production to place of use, and bituminous coal is conveyed by water at very low rates. This coal is taken from Pittsburgh to New Orleans at 50 cents a ton. Bituminous coal is carried at less rates because of its distance from market, and because it is all one grade and does not need any extra handling at the point of shipment, or at the point of loading.

It may be said of bituminous coal that the price paid for digging represents largely its cost; but this is not so in regard to anthracite. Of this coal, as it is sold to consumers, one might truly say it is a manufactured article. The mere wages of mining it are but a modicum of the cost of the domestic sizes per ton, on board cars at the foot of the breaker, ready to start on its way to the consumer. One may open up a soft coal operation for one-twentieth (or less) the cost of an anthracite colliery, with its breaker, &c.

The tonnage dealt in at certain cities shows the extent of the industry, though in some places not all the tonnage referred to is not consumed there. The figures show the importance of the coal business to these cities. Thus we have the great lake ports, with Buffalo, 8,100,000 tons; Cleveland, 5,200,000 tons; Toledo, 6,545,000 tons; Erie, 1,500,000 tons; Ashtabula, 1,400,000 tons; Milwaukee, 1,600,000 tons; Duluth-Superior, 3,700,000 tons, and Chicago, 9,000,000 tons. On the Mississippi and its tributaries we have Pittsburgh, 25,000,000 tons (part of which goes to lower river ports); Cincinnati, 3,250,000 tons; St. Louis, 4,400,000 tons; Louisville, 1,420,000 tons, and New Orleans, 2,300,000 tons. On the Pacific coast there is Seattle with 910,000 tons, Tacoma with 400,000 tons, and San Francisco with 1,500,000 tons. There has been loaded at the shipping ports on the Atlantic: Hampton Roads, 4,700,000 tons; Baltimore, 4,500,000 tons; Philadelphia, 12,000,000 tons, and New York ports, 16,000,000 tons. Boston gets 4,500,000 tons, and Providence 1,700,000 tons. It is said that the total receipts at London, England, amount to 15,000,000 tons a year, for all uses—locally and shipping.

The sizes of anthracite are more numerous than many

* Extracts from an address before the Modern Science Club of Brooklyn by F. E. Saward, editor of the *Coal Trade Journal*.

persons suppose, as the coal comes up out of the mine in a very mixed condition, containing all manner of sizes, with dirty and boney coal. As it passes through the breaker, where it is screened and sized, it goes off in the following sizes: Lump, steamboat, broken, egg, stove, chestnut, pea, buckwheat, rice, barley, mustard, culm. One important company make the following report on sizes as made at the breaker: Larger than pea, 64.31 per cent.; pea, 14.33 per cent.; buckwheat, 17.47 per cent.; rice, 3.85 per cent.; barley, 0.02 per cent. The washery product of the culm bank, reported by the same concern, shows: Stove, 3.11 per cent.; chestnut, 8.24 per cent.; pea, 18.48 per cent.; buckwheat, 39.40 per cent.; rice, 27.11 per cent.; barley, 2.91 per cent.; culm, 0.07 per cent. Very few except the older banks yield any of the stove and chestnut. Pea began to be largely used in 1867, buckwheat in 1878, and the smaller sizes about 1895. The royalty on anthracite, where mines are leased, runs at from 25 to 50 cents, as to size; average about 31.25 cents. The royalty on culm bank ranges between 10 to 15 cents.

On the Great Lakes the boats take coal 1000 miles for 30 cents a ton, and an average cargo of 7000 tons is put in one of these readily in a day, and unloaded in about the same length of time, the machinery and facilities for doing so on the lakes being a great deal better than those on the Atlantic coast. Cars loaded with 40 tons are lifted bodily and their contents dumped into the vessels. The four largest vessels on the Great Lakes are: The "James J. Hill," the "John W. Gates," the "William Edenborn" and the "Isaac L. Elwood." These are sister ships, owned by the United States Steel Corporation, and their dimensions are 498 feet over all, 478 feet keel, 52 feet beam, 30 feet depth. They have each carried as much as 8400 gross tons of iron ore on an 18-foot draft. There are a hundred or more steamers of 5000 to 7000 gross tons capacity in the lake service, and, of course, their dimensions are proportionately smaller than the ships above referred to.

The combined registered tonnage in the foreign trade at New York, Boston, Philadelphia, Baltimore, New Orleans, San Francisco and Puget Sound for the entire year 1901 was 18,868,808 tons entered, and 18,487,246 tons cleared, or somewhat more than half the total tonnage reported for the great lakes during seven months of 1902. A further analysis of this enormous total showed that 14 ports each report arrivals and clearances of 1,000,000 tons and over. Five ports—Chicago, Milwaukee, Duluth, Cleveland and Buffalo—each show clearances of 2,000,000 tons over and over. The combined arrivals of these five ports was 11,421,099 tons, and the clearances 11,455,544 tons. As an example of quick loading on the coast, it may be stated that the Thomas W. Lawson loaded 7523 tons of bituminous coal at Curtis Bay pier of the Baltimore & Ohio Railroad in ten hours, 6000 tons being loaded in six hours.

There is no class of labor which is so well paid for the service rendered as the coal runners; the main trouble of short time is due to the disinclination to do more than a certain quantity in the month. Any one with experience along this line, in any country, will indorse the opinion that this is so with the average worker in the mines. It is this which makes the average number of days worked in the course of a year as low as it is within recent years at least. With the improvement in the general industrial situation there has been the opportunity for a greater number of days per week, month or year, but one does not find that the net result was what was expected, for the reason above stated. With many, the desire is for a certain sum, to be realized in as short a time as possible, thus leaving more time for pursuits in other lines of pleasure or profit.

The number of employees in mining is put at 147,000 in the anthracite region, and 350,000 in the bituminous districts. The number of days worked in the soft coal mines have been about 235 in the year. In the anthracite region 98,434 men and boys are employed inside the mines, and 49,217 are employed outside. In the bituminous fields of Pennsylvania, the number employed inside is 95,562, and 22,040 employed outside, making a total of 265,253 employees in the one State of Pennsylvania, and indicating its importance in the coal industry. Much soft coal is now mined by machinery, and the number of tons so mined in the United States in 1901 was 57,843,335 tons, and perhaps reached 70,000,000 tons this year.

Coke making is a great industry, as an adjunct to the coal business. The report for last year shows 39,604,000 tons of coal used for this purpose; the yield of coke being 25,401,730 net tons, or, say, 64 per cent. The number of ovens at the close of the year 1902 was 69,069. The three principal States are Pennsylvania, Alabama and West Virginia, in this order:

	Tons coke made.
Pennsylvania	16,499,910
Alabama	2,552,246
West Virginia	2,516,505

With the average cost at ovens put at $2.49 per ton.

One need not "view with alarm" the control of the coal supply, of which there is a great deal said in certain quarters. Experience teaches us that the prices are kept at a fair rate, all the time, instead of wildly fluctuating rates. Many users of coal can remember that prices have varied $1 or more a ton in a year, during what were termed normal times, when the individual or small operator was in full force. One could not tell if his neighbor was getting a supply at cut rates, and that was that which made his cost sheet vary from one who was doing the very best that his plant could or would do. An evenness to prices is far better, for it puts all on an equal basis, so that the ingenuity of reducing cost must be developed along more scientific or mechanical lines, and not be a subject of cut rates on coal. Not that all coal is capable of the same results, but the cost being even, or nearly so, a great deal better opportunity for fairly competitive work is afforded. The most economical smoke consumer, to the concern which uses soft coal, is a well paid and intelligent fireman, and this grade of fuel is being burned to-day in many places without being a nuisance to the neighborhood in which it is used, simply from the fact that it is handled intelligently in the fire room.

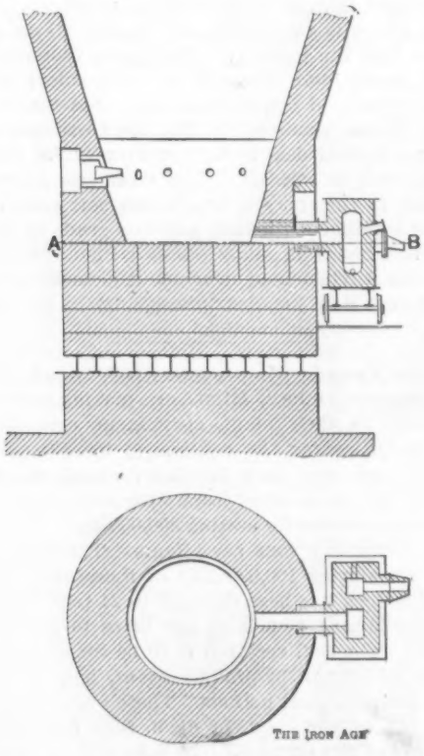
Zenith Furnace Improvements.—The Zenith Furnace Company, Duluth, Minn., are making extensive improvements in their plant, sparing no expense in providing facilities for the economical handling of materials. A new coal dock has been completed, which is equipped with three Mead towers for unloading coal from vessels, and pockets for storing 300,000 tons. The capacity of each tower is 3 tons per minute. The dock also has pockets for storing 100,000 tons of limestone. The channel to this dock has been dredged to 24 feet in depth, enabling the largest vessels on the lakes to gain access to the plant. The coal received is to be coked in a battery of 50 Otto-Hoffman by-product ovens, now in course of erection near the coal pockets. These ovens are expected to yield 300 tons of coke per diem, fully covering the requirements of the furnace. The coke will be handled automatically from the ovens to the furnace top. Buildings are being erected for the by-product plant, including concrete holders for the storage of the gas. The gas will be consumed by the city, and the ammonia and tar sold in the open market. The cast house having proved too small, an extension 60 feet long is being added. A new blowing engine, built by the Cleveland Shipbuilding Company, is being installed. When all the improvements are completed, the capacity of the furnace is expected to be 250 tons a day. The stack is being relined, and will be ready for blowing in about February 1. The president of the Zenith Furnace Company is A. B. Wolvin, and the secretary is J. L. Washburn.

The settlement of the litigation on aluminum patents between the Pittsburgh Reduction Company of Pittsburgh and the Electric Smelting & Aluminum Company of Cleveland is reported to have involved a very large amount of money. The Pittsburgh Company are stated to have paid $500,000 in cash, and to have obligated themselves to pay further large sums in installments. The company have taken an exclusive license under the Bradley patents, paying a royalty to the Cowles Company.

Blast Furnaces with Continuous Flow of Metal.

We published in the issue of *The Iron Age*, November 12, an article describing a blast furnace, with continuous flow of metal, the facts being taken from *Stahl und Eisen*. A later number of our German contemporary contains an interesting letter on the subject from Alexander Sattmann, who agrees that a successful "continuous" furnace would have many advantages over those working on the present system.

He points out that the essential novelty in Stapf's invention is the construction of a dam or retaining wall in front of the tap hole, causing the molten metal to rise above the latter and thus prevent the egress of the cinders therefrom. The arrangement shown in Fig. 4, *The Iron Age*, November 12, he characterizes as an unsuccessful adaptation of an invention of his own. The success of Stapf's arrangement would depend on the hearth bottom always remaining at the same hight, which in practice is not the case. If the general level of the furnace bottom should not rise it would contract the area of the iron notch and necessitate raising the same which, under the circumstances, would be a difficult operation. Even if the bottom level should remain unchanged the washing action of molten iron on both sides would soon destroy the upper part of the iron notch and entail difficult repairs.

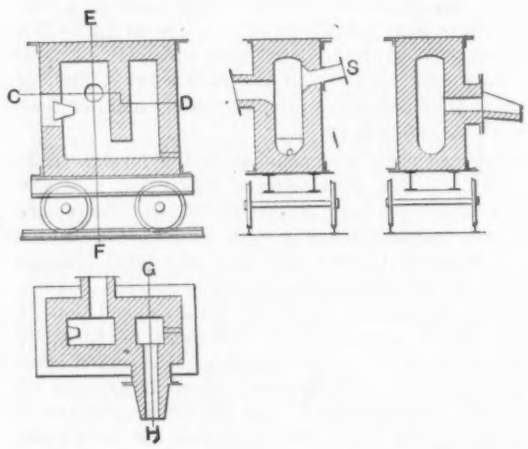


Mr. Sattmann refers to a previously published suggestion of his own—namely, to effect the separation of the metal and slag in a slag separator, connected with but separate from the furnace proper. The iron runs from the usual iron notch into the fore chamber of the separator, thence under a dividing wall which restrains the slag, into the second chamber and from there to the pig bed or casting machine. The slag notch may be either in the fore chamber of the separator or in its usual place in the hearth. In the latter case it is necessary to dam up the metal to a higher level than in the former. If the cinder notch is in the separator, slag and iron flow together through the iron notch without filling the same, but if it is in the hearth the iron notch will be permanently subject to the liquid pressure of the bath of metal. By permitting iron and slag to run out together continuously as fast as made the metal will be subjected for a shorter period to the influence of the incandescent coke, and will, in consequence, contain less carbon. The opinion is now very generally held that carbon enters the iron after the latter has descended below the tuyere level, the absorption being accompanied by considerable loss of heat. If this view is correct it is plain that the continuous process would yield a metal hotter and lower in carbon than is now the case, which would be clear gain to the steel works, especially if using direct metal.

The accompanying figures show the construction of the slag separator. The slag runs off through a clay lined pipe (omitted in the figures) which bends down into a sump. The hight from the bottom of the pipe to the overflow of the sump must correspond to the pressure in the furnace. If the cinder notch is to be located in the hearth the opening through which the iron leaves the separator must be correspondingly higher up, necessitating the chambers being built higher than is the case in the figures, which presuppose the slag as well as the metal entering the separator. At the floor level of the apparatus is a taphole for completely emptying the same in case of need. Opposite the opening from the furnace is a "peep-hole" for observation, and through which a bar can be used if necessary. It will obviously be a matter of greater difficulty to keep this opening clean if the slag is run off from the hearth than will be the case if the cinder notch is in the separator. To facilitate rapid changing it is convenient to have the whole arrangement on a truck, and to so arrange the short section of track on which it stands when in actual use that it may be raised or lowered hydraulically or otherwise. This will permit of rapid adjustment to slight variations in the position of the iron notch.

Mr. Sattmann sums up the advantages which his apparatus has, as compared with Mr. Stapf's invention, as follows:

1. The iron notch is easily accessible.



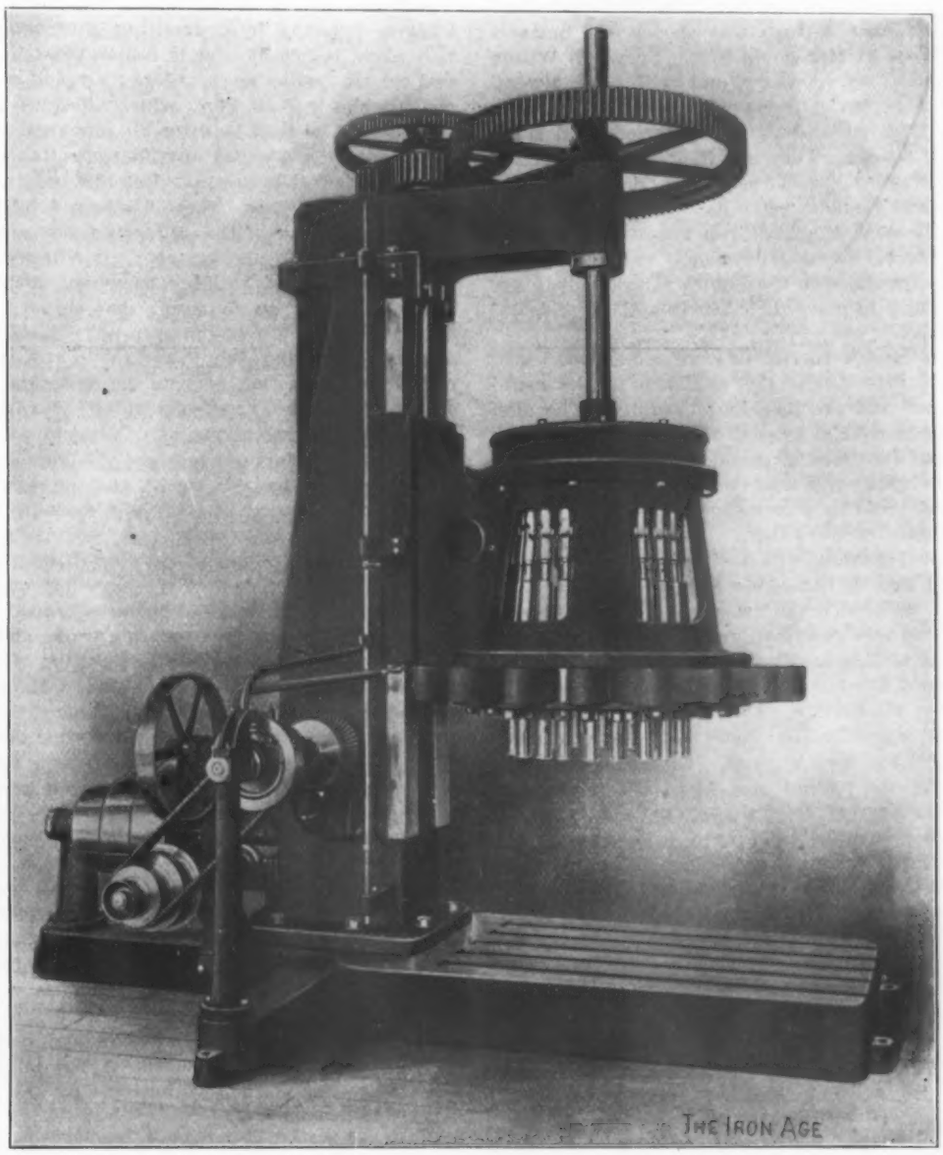
THE SATTMANN SLAG SEPARATOR.

2. The separator can accommodate itself to the hight of the iron notch.
3. The refractory block which actually separates the slag can be changed in a few minutes.
4. No part of the hearth jacket is subject to the action of molten metal on both sides at the same time.
5. The separator can be attached to any furnace without necessitating a shut down of more than a few hours.
6. The apparatus is quite inexpensive.
7. In case of need the former system can be reverted to in a few hours.

Newton's law of gravitation, which states that two bodies attract each other with a force inversely proportional to the square of the distance between them, has been made the subject of an exhaustive investigation by Professor Brown of Haverford College. He announces that his calculations show Newton's laws to represent the motion of our moon to within the one-millionth part of 1 per cent., and states that no other physical law has ever been expressed with anything like the precision of the simple statement of this one.

A Baush High Speed Adjustable Multiple Drill.

The accompanying engraving shows one of the seven multiple drills which the Baush Machine Tool Company of Springfield, Mass., have built for Eaton, Cole & Burnham Company of Bridgeport, Conn. The machine is a 20-spindle multiple, designed for drilling valves at a high rate of speed. The machine is driven by a 7-inch belt, and is provided with roller and ball bearings. The head is moved up and down on the post by a screw operated by a patent automatic feed and stop device, which makes it easy to handle and rapid in operating, besides relieving the workman of much unnecessary manipulation. The machine is equipped with a quick return.



BAUSH HIGH SPEED ADJUSTABLE MULTIPLE DRILL.

High speed tool steel drills are used in these machines, and speeds and feeds are as follows:

Size of drill. Inches.	Radiations per minute.	Feed. Inches per minute.	Size of drill. Inches.	Rotations per. minute.	Feed Inches per minute.
1/2	500	3 1/4	1 1/8	220	2 1/8
5/8	400	2 3/4	1 1/4	200	2
3/4	335	2 1/2	1 3/8	185	1 7/8
7/8	290	2 1/4	1 1/2	175	1 3/4
1	250	2 1/4			

These speeds are based on a periphery speed of 65 feet per minute. The feed increases from 1 inch of feed per 150 rotations to 1 inch of feed per 100 rotations. The machine as shown weighs about 23,000 pounds; the total hight is 14 feet 5 inches. The Bocorselski universal joint is used, as in all Baush multiple drills, the company owning the patents.

Springfield Metal Trades Association.

The Springfield Metal Trades Association has been organized by manufacturers of Springfield, Mass., and the cities and towns within a 25-mile radius of Springfield, following the same general plan of similar associations that have been established in a number of cities under the auspices of the National Metal Trades Association. The Springfield Association starts in with a sufficient membership to assure its success and the success of the laber bureau which it is proposed to establish. Nearly all the large concerns in metal lines in the vicinity of Springfield have joined in the movement. These officers have been elected:

President, E. H. Cutler of the Knox Automobile Company, Springfield.

Vice-President, Charles P. Fay of the J. Stevens Arms & Tool Company, Chicopee Falls.

Secretary, David Hunt, Jr., of the Baush Machine Tool Company, Springfield.

The treasurer is to be elected later. The Executive Committee consists of these officers and of Richard D. Reed of the H. B. Smith Company, Westfield; Charles L. Newcomb of the Deane Steam Pump Company, Holyoke; W. H. Baush of the Baush Machine Tool Company, and F. C. Feiker of the Northampton Cutlery Company, Northampton.

The plan of organization includes a committee of three for each of the four important divisions of labor in the metal trades as represented in the association,

the chairman of each of these committee to be a member of the Executive Committee. These chairmen are R. D. Reed for the molders, C. L. Newcomb for the machinists, W. H. Baush for the pattern makers and F. C. Feiker for the polishers. The other members of these committees have not been named. The idea is to refer all matters relating to any one of these trades to its committee, who will report to the Executive Committee or to the association.

The labor bureau will be established as soon as the organization is perfected by the adoption of by-laws.

Boston Labor Bureau.

The Boston Labor Bureau was opened for business on December 1, at 34 Merchants Row. Frank A. Wilson has been engaged as secretary and will have general charge of the work, under the supervision of a committee of three, one from each of the organizations which are conducting the bureau. They are E. P. Robinson of the Boston Metal Trades Association, Fred. F. Stockwell of the New England Foundrymen's Association and Elmer F. Smith of the New England Iron League. Already a considerable number of men have been enrolled, including many out of work, who were quick to take advantage of the opportunity to place their services at the disposal of manufacturers.

The bureau expects shortly to have about 8000 workmen enrolled. This means the workmen in the metal trades in Boston and the immediate vicinity. The plan is to extend the territorial scope of the work as times goes on, to reach out into New England, excepting those sections that have labor bureaus of their own, like Worcester, Springfield, and probably Providence, where such a project is now under consideration. But for the present the Boston Labor Bureau will deal only with the workmen of the city and its immediate suburbs.

The system adopted is patterned after that in use in Worcester, which was described and illustrated in detail in *The Iron Age* of July 9. There are a few changes. One concerns the card filled out by the manufacturer when a workman leaves his employ. The Worcester record contains no blank space for the wages paid the workman. The Boston card has such a space. The purpose is that the secretary of the bureau may know the workman's wages, and thus prevent a man receiving a position for which he is not qualified and with wages which his previous experience has shown he cannot earn. It does not follow that the secretary will give the exact wages of a workman to the manufacturer who wishes to employ him. Another new feature is a little card containing the address of the Labor Bureau, which the manufacturer will give a discharged employee or an applicant for work, to assist him in finding the bureau. Once a week each subscriber to the bureau will receive a list of idle men with their special work.

It is proposed by Mr. Wilson that a system of interchange be established between the different labor bureaus to further facilitate the finding of places for idle workmen. This would mean not only exchanging lists of idle workmen, but also lists of places which are available for them. It often happens that there is a demand for help in one city while there is a superfluity of the same class in another city.

Youngstown Mills Resume Operations.—A number of the manufacturing plants at Youngstown, Ohio, which have been closed for some time have started up again, and others are getting ready to resume. The Bessemer plant of the Republic Iron & Steel Company, which was idle for about a month, started up on Sunday, December 6. The Valley plant of the Republic Iron & Steel Company started partially on Monday in the puddling department, and during this week some of the finishing mills will go on. In the Brown-Bonnell plant of the Republic a number of finishing mills have started, while the Upper and Lower mills of the Carnegie Steel Company started up on Monday last. The Girard plant of the Carnegie Steel Company, at Girard, Ohio, which has been closed for some time, is expected to start on Monday, December 14.

Pacific Coast Prospects Favorable.

SAN FRANCISCO, Cal., November 30, 1903.—The rains have been steady and nearly continuous now for a fortnight, and the result has been unusual activity in agricultural and mining circles all over the State north of Tehachapi. Agricultural implements, mining machinery, oil well machinery and pipe will feel the good effects before anything else in this line—machinery for the mines first of all. There has been a falling off in general business during the past three weeks or so owing to various causes. The rains, though helpful to a big harvest next year, were accompanied by storms that interrupted transportation along the coast, and to some extent in the interior, and we are feeling more or less the reaction arising from the troubles in New York, which affect us in more ways than one. The East is, after all, our great market—New York especially so—and anything affecting its prosperity is sure to affect ours also. But this quietude cannot be expected to last long. There has been a falling off in the number and value of the contracts for new buildings, but this is probably temporary also. It will not immediately affect the sales of building hardware, although it may cause hesitancy as to future purchases. It is by no means general. For instance, in Los Angeles, which ordinarily falls behind San Francisco in this respect, there were in a recent week permits issued for the construction of buildings the aggregate value of which exceeded $1,000,000. So that throughout California, and especially in the southern part of the State, the outlook in the hardware line is particularly good. And the same is true in a greater or less degree of the whole coast.

The retail trade has been very good all the year. One of the leading retailers of the State said to your correspondent the other day: "We have had one of the best years in our experience and business is good now. There is a good demand for the building trade, and there is no importance to be attached to the light list of contracts for new buildings recorded lately. The contracts made during the year are still in process of being satisfied, and the lull now observable is only for the time being. It will not last, and there will be as many new buildings contracted for in 1904 as in 1903." And so it is with business people in general. There will, perhaps, be more Eastern machinery, &c., used in this State next year than there was last year, as manufacturers will be able to supply our wants and more reasonable prices are looked for. As to the cost of labor in the building trades, that will be more or less of an unknown quantity. An attempt is being made to cut down wages to the minimum rate allowed by some of the unions, but it is very doubtful whether it will succeed at present. At any rate, the tendency in the matters of both wages and materials is in favor of those who will engage in the improvement of their properties, and a good business for the coming year may be looked for.

There is a good demand for Eastern pipe in this market. The export movement for the past couple of weeks has been good, but as usual consists chiefly of Eastern goods in transit—bicycles, cash registers, sewing machines and machinery. The exports of machinery have been large of late. To this may be added pipe, principally for the Hawaiian Islands, but the exports thither for the past year have been nothing like what they were a few years ago, when all the plantations were making big improvements. J. O. L.

Foundry foremen in Chicago have established a local branch of the Associated Foundry Foreman. The officers elected at the opening meeting are: President, C. E. McArthur, foreman Western Electric Company; vice-president, M. C. O'Connor, foreman Allis-Chalmers Company; secretary, H. J. Holmes, Brown Brothers Mfg. Company; treasurer, John Balkwill, Davis & Ludwig Foundry; sergeant-at-arms, E. Welsch, Bolter & Sons Foundry. The main object of the formation of the association is educational advancement of the foreman and the betterment of his interests as well as those of his employer.

Notes on the Design of Rolls.*

BY EMIL KIRCHBERG.

Progress in the Design of Rolls.

Although little progress has been made in the design of rolls, the arrangement of the passes has changed to correspond with increasing production. When the work formerly done on one pair of rolls was divided between several more powerful engines were needed. The increase in speed gave rise to difficulties in roughing, where the piece being short was often carried too far, necessitating extra work to bring it back and causing unnecessary loss of heat. To avoid this evil separate roughing stands were provided, while for very small sections (rods) three stands became customary. More recently, especially in America, continuous mills have come into use. There is a tendency to resort to reversing mills, making possible an increased speed as the length increases. All these changes, however, have been without influence on the design of the passes. Rounds and squares are still made by the same process as 30 years ago, only in some works it has become customary to roll rounds up to 6 inches through guides. For flats, on the contrary, universal and four-high mills have come into use. Rolls for I-beams and channels, on the other hand, show distinct progress in the decreased number of passes and consequent increased production, and the same is true with regard to rail mills.

Changes During Rolling Especially with Regard to Acceleration and Spreading.

The cold rolls chill the surface of the material, imparting a greater resistance to the same and enabling it to drag with it the softer middle portion. At the moment of entering the outer layer of the material is first grasped and drawn in while the softer middle portion is forced to the rear and into the bloom, causing the formation of a swelling immediately behind the rolls (Fig. 1). The further the steel passes through the thinner it becomes and the deeper the chilling action of the rolls extends. At the points C and D (Fig. 1), where the cooling off extends to the center, the surface has the same speed as the latter and as the surface of the rolls. As the rolls revolve through the distances A C and B D, a body of the section A C E D B is forced through the space A B. The rectangle thus formed, corresponding to the section A C E D B, being limited as to hight by the length A B must be longer than A C. The speed at which the steel leaves the rolls is therefore greater than the circumferential speed of the latter, and the length passed through at each revolution is greater than the circumference (Fig. 1). There is therefore an acceleration of the piece rolled. Since A B is smaller than C D, when the body A C E D B is forced through the steel drags on the surface of the rolls, and therefore the principal change in the position of the molecules takes place in the center. The surface is somewhat retarded while the center is accelerated. That this actually takes place is shown very plainly by Hollenberg's experiments, which indicate by the characteristic shape of the wires the holding back of the external layer (Fig. 2). This tendency causes, as in the first period, a thickening of the steel, and to this is due the well-known fact that rolled material is always rather thicker than the actual distance between the rolls. The operation of rolling may therefore be divided into three periods: First, the surface is drawn forward and the center forced back, the speed of the steel being lower than the circumferential speed of the rolls. Second, surface and center have the same speed, equal to the circumferential speed of the rolls. Third, the center has a greater speed than the surface, material leaving the rolls at greater speed than that of the circumference.

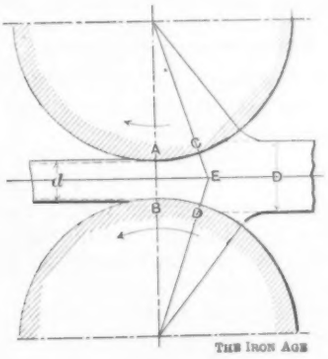


Fig. 1.

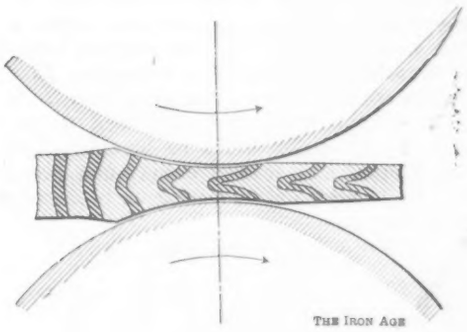


Fig. 2.

In order to determine the amount of acceleration rolls of various diameter were provided with grooves which, at each revolution, made corresponding marks in the steel. By afterward measuring the distance between these marks and comparing the same with the circumference of the rolls, the lead was determined without trouble. Measurements of marks made by the first revolution of the mill (allowance being made for shrinkage) showed the amount of acceleration to be dependent firstly on the draft and secondly on the diameter of the rolls—that is to say, the size of the angles α and β (Fig. 3).

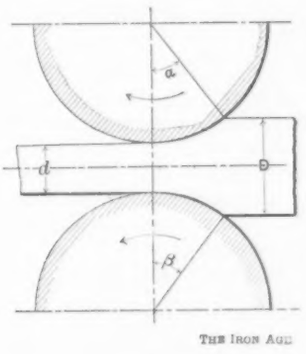


Fig. 3.

It was proved that the acceleration V, calculated for each inch of circumference, was equal to the sum of the angles α and β in thousandths of an inch; therefore $V = \frac{\alpha + \beta}{1000}$ inch per inch circumference. If, for instance the angles α and β are 22° and 26° respectively, the lead per inch of the roll circumference is

$$V = \frac{22 + 26}{1000} = \frac{48}{1000} \text{ inch.}$$

While this formula cannot be said to be absolutely correct, it is sufficiently so for practical work, since any slight difference can be easily adjusted by the housing screws or by any other means which will be mentioned later. As stated, the first revolution of the rolls was used to determine the amount of acceleration. The necessity for this is due to the fact that as the rolls by contact with the metal take up the heat the surface of the metal undergoes less cooling, and in consequence the second period begins later, and acceleration is diminished.

In rolling articles in periodic passes the influence of roll temperature on acceleration may be particularly well observed, as may be seen from the following case

* From a paper printed in *Stahl und Eisen.*

in actual practice: On a spoke rolling mill, which made one spoke per revolution, each bloom (7 hundredweight) yielded 18 spokes. It was found, however, that only four of these were within the prescribed limits of length, while the fifth was about 15 mm. shorter than the first. After about eight or ten pieces had been made the acceleration was zero, and then, as slipping took place, became negative, so that the difference in length amounted to 80 mm. By cooling the lower rolls with water (Fig. 4), which was previously used on the upper rolls only, all 18 spokes could be brought within the prescribed limits, and it was even found possible to regulate the lengths by increasing or decreasing the amount of water.

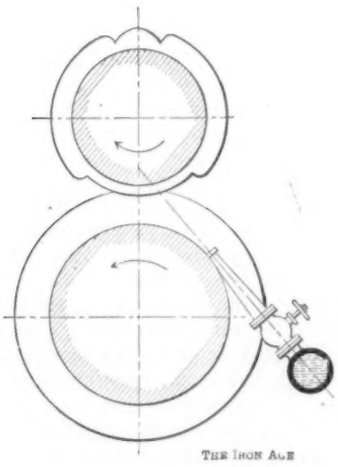


Fig. 4.

Lessened acceleration, due to the heating of the rolls, leads to decreased speed, which shows that water should be used on all rolls and not, as is usually the case, on the top rolls only, whereby the middle and lower rolls are only subject to its influence when running idle. The increased speed made possible by this method would doubtless compensate for the greater loss of heat caused by the cooler rolls.

Increase in Width Caused by Draft.

Coincident with the experiments to determine the amount of acceleration, an attempt was made to ascertain the increase in width of the steel caused by the draft. The result shows that this also is dependent upon the size of the angles α and β, but inversely proportional thereto. The greater the sum of these angles the less the spreading, and *vice versa*. The spreading can be approximately expressed by the formula:

$$(D - d)\ \frac{l}{\alpha + \beta}$$

In which D is the thickness of the steel before rolling, d the thickness thereafter, and α and β the two angles, expressed in degrees. The influence of acceleration on spreading is of practical importance because after a pair of rolls has been turned several times the two angles α and β are increased, and with them the acceleration. It then becomes necessary to add metal at a (Fig. 5), since, owing to the increased acceleration, the steel is more drawn out, and in consequence is spread less and does not fill out the pass.

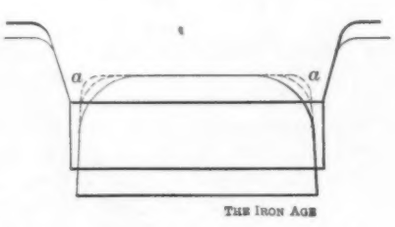


Fig. 5.

The result of the rolls becoming hot shows itself in practice by the section becoming heavier at the rear than at the entering end, owing to the decreased acceleration and consequent increased widening. This fact often leads to the formation of seams.

The Maximum Draft in Relation to the Material and Roll Diameter.

The forces which cause the passage of the metal through the rolls act tangentially to the circumference of the latter. These forces may be divided into positive and negative. Positive tangential forces are those which cross each other behind the vertical $x\ y$; negative, on the contrary, which cross in front of the same (Fig. 6).

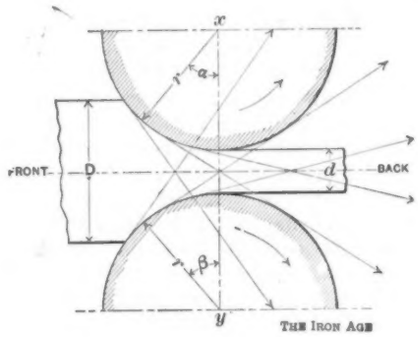


Fig. 6.

Zero is represented by the forces crossing on $x\ y$. If positive and negative forces act simultaneously on the material, either the rolls slip or the material is cracked and strained and must, if the tensile strength is exceeded, tear apart. In order, therefore, to avoid unnecessary tearing of the material only positive tangential forces must be formed. The maximum thickness, D max., of the material before going through the rolls is therefore determined by the zero point, and is dependent on the radius of the rolls r and the thickness to be rolled d; it may be expressed by the formula:

$$D\ \text{max.} = \frac{(r + 0.5d)^2 - r^2}{r + 0.5d}$$

The increase coefficient, or relationship of the sectional area of one pass to that of the next succeeding one, k max., amounts, therefore, to

$$k\ \text{max.} = \frac{D\ \text{max.}}{d} = 1 + \frac{r}{r + 0.5d}$$

from which may be seen further that k max. must always be less than 2, and approaches nearer to that number the smaller d is made in comparison to r. The coefficient hitherto customary, k max. = 2, can, therefore, only be used in cases where the tensile strength of the material is not exceeded thereby. The following table shows the values of D max. and k max., together with the corresponding angles α and β:

Table I.

d	D max.	k max.	α or β.
0.05 r	0.09878 r	1.9756	12° 40′ 40″
0.10 r	0.19524 r	1.9524	17° 45′ 15″
0.20 r	0.38182 r	1.9091	24° 37′ 12″
0.40 r	0.73350 r	1.8340	33° 33′ 25″

If the angles α and β become greater than 30°, corresponding to a reduction $D - d$, equal to about one-tenth of the diameter of the rolls, the latter will no longer grip the material.

The Plasticity of Steel in Relation to Temperature and Speed of Rolling.

Successful rolling depends principally on the rightful consideration, when designing rolls, of the plasticity of the metal at the prevailing temperature. A bar of steel by being rolled loses heat and therefore plasticity, and the passes must be designed in such a manner that the steel attains its final form with as few reductions as possible. The simpler the finished section the less care is necessary in dividing the work among the various passes.

The sections a to f in Fig. 7 are of simple form and offer little difficulty, while those indicated by g, h and i differ but little from the flat shape and are fairly easily handled. It is different with the sections k, l, and m.

It is easy in designing rolls for sections *a* to *i*, by working back from the final form, to arrive at the correct shape and area of the bloom required, because it is only a matter of decreasing the hight. The pressure being evenly divided over the whole area, the danger of strains and tearing of the material hardly need be considered.

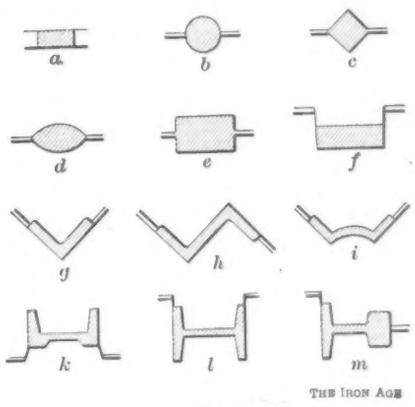


Fig. 7.

With more complicated shapes great care is necessary to prevent some parts of the same being subject to greater strains than others, an ever present danger on account of the deep grooves in the rolls. In order to form the desired section, the creation of side pressures is necessary, and those, if not properly controlled, give rise to strains, waviness and cracks.

Simple forms, such as flats, rounds, squares, &c., may be regarded as being formed by direct pressure, by which is meant pressure exercised jointly by the upper and lower rolls. When rolling beams, channels and other complicated sections there is also an indirect pressure between the surfaces of one and the same roll caused by the material being squeezed in a closed narrow area.

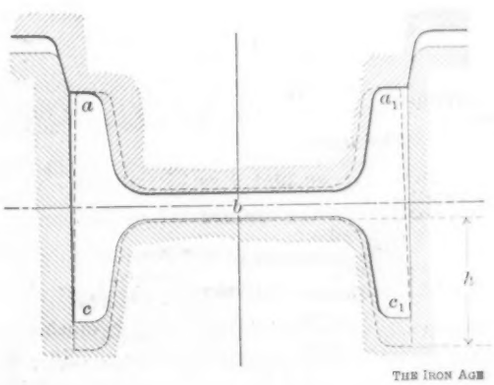


Fig. 8.

This is explained in greater detail on the design of the passes for I-beams (Fig. 8). The upper rolls exert direct pressure at *a*, a_1 and *b*; but the flange, lying in the lower roll, is chiefly formed by diminution of the hight *h*. According to the degree of plasticity in the metal, a certain side pressure (indirect pressure) may be exerted at *c* and c_1. Direct pressure may be applied more or less at random, but in figuring indirect pressure it is necessary to stay within certain well defined limits. If, for instance, the flange which is to be formed by indirect pressure is thinner than the corresponding portion of the following pass (Fig. 9), some of the metal will be utilized to fill out the groove. This causes decreased elongation of this flange, resulting in a movement toward that side, and, corresponding to the amount of same, the flange *b* becomes smaller, or, as is said in practice, it shrinks.

If, on the contrary, flange *a*, which is subject to indirect pressure, is too heavy, it cannot enter far enough into the groove (Fig. 10), but will leave a space at *c*.

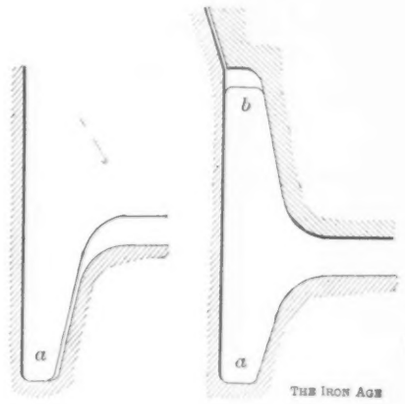


Fig. 9.

A corresponding amount of metal will be forced to the other side and cause the formation of a seam at *d*. In order to avoid the above evils the work done by indirect pressure must, as is well known by experienced roll designers, be kept within certain narrow limits.

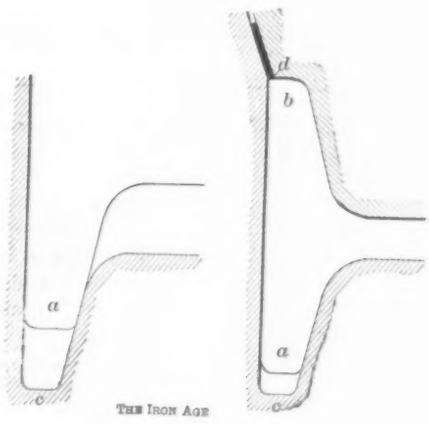


Fig. 10.

The plasticity of steel can be determined with sufficient exactitude by reference to drawings of rolls which have been successful in practice, and the following method is suggested: Two adjacent passes, A and B, are laid out together (Fig. 11), and, as repeated measurements and experiments on rolls of approved designs have shown, each dimension *dx* of the pass A has a corresponding dimension, *dy*, in the following pass B, the relation of the two dimensions being given by the following formula:

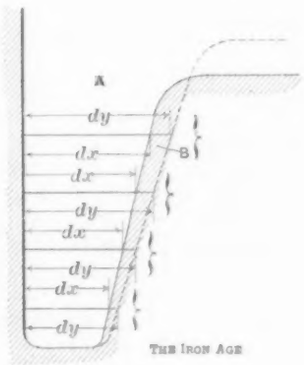


Fig. 11.

$$dy = dx\left(1 + \frac{dx}{200}\right)$$

$$dy = dx + \frac{dx^2}{200}$$

The coefficient of increase is:

$$kd = dx + \frac{dx^2}{200}$$

and the draft Zd (indirect pressure):

$$Zd = \frac{dx^2}{200}$$

This formula corresponds to a parabola.

Table II.

dx in millimeters.	dy in millimeters.	dy in millimeters according to the formula: $dy = dx = \frac{dx^2}{200}$
Measured on rolls which have proved satisfactory.		
8	8.25	8.32
8.25	8.50	8.59
9	9.25	9.405
9.5	10	9.95
11	11.5	11.605
11	11.75	11.605
12	13	12.72
12.5	13.25	13.28
13.5	14.5	14.41
15	16.5	16.125
16.5	18	17.80
17	18.5	18.445
20	22	22
20.5	22.5	22.6
27	30	30.6
28.5	32.25	32.55
30	34	34.5
34	40	39.780
44	56	53.68
56	70	71.680
70	90	94.5

The dimensions so obtained allow the flange to be formed by indirect pressure without causing shrinkage or the formation of seams, and they correspond therefore to the plasticity of the metal.

If the dimensions chosen differ by more than 5 per cent. from those given above, either by reason of wear of the rolls or of mistakes in turning, there will be either shrinkage or a seam. This fact may be observed especially plainly in the smaller sizes of I-beams, where the difference of the values dx and dy on account of the thinness of the material are of necessity very small, thereby making it easy to depart from the above prescribed limits either in turning or by too long use of the rolls.

What has been said concerning the plasticity of steel gives the following rule: Plasticity during rolling is proportional to the thickness of the piece and to the temperature of the same.

Draft in Relation to Temperature and Plasticity of the Metal.

A bloom coming from the furnace holds a certain amount of heat, dependent on its temperature and proportional to the cubic contents. The loss of heat by radiation and contact with the rolls is proportional to the superficial area. The work on the steel gives it an amount of heat corresponding to the power used; according to theory, one British thermal unit for every 778 foot pounds. If insufficient draft is given the heat lost exceeds the gain, and the power necessary for subsequent passes is increased proportionally. The time during which cooling off takes place is proportional to a figure obtained by dividing the cubical contents of the bloom by the surface of the same, and since this relation becomes more and more unfavorable as the piece becomes thinner, the draft should be as heavy as the thickness and temperature will allow. This is more important in the finishing rolls, where the sectional area is small, than is the case in the roughing rolls, where the relationship is more favorable, and the chilling less noticeable. In many works the same draft is given in all passes, which, however, is completely wrong. If the draft is too light the rolling will be slow and therefore cold. If, on the other hand, too much is given, it causes rapid wear of the rolls and consequent inability to get the correct section without too frequently turning rolls.

From the above it will be seen that:

1. The hotter the material in the rolls the less the power necessary.

2. The lighter the draft the cooler the rolling, and the more engine power needed.

3. The least power would be required if the heat derived from the work equaled that lost by radiation, &c.

This is, in most cases, however, impossible, as the draft required would be so great as to lead to the previously mentioned difficulties, and unreasonably large engines and mills would be needed. The draft must therefore be regulated by the hardness of the material of which the rolls are made, in order that the same shall not be subject to too rapid wear. This necessitates a reference to practical experience, which teaches that the amount of draft depends greatly on the section to be rolled. The simpler the final form of the product is and the harder the material of which the rolls are made the greater can this draft coefficient be.

The following values have proven satisfactory in actual practice:

For finishing passes for hard steel:

f = 10 to 20 per cent.

For roughing passes, tees, I-beams, channels, &c.:

f = 20 to 30 per cent.

For roughing passes, angles, Z-bars, ties, &c.:

f = 30 to 40 per cent.

For small bars and rods, according to the material in the rolls (cast iron, chilled iron or steel):

f = 40 to 50 per cent.

In a very few cases, for instance in oval passes, the maximum draft is used.

Since, as has been shown, the plasticity of the material increases with the thickness d, the draft f for parts subject to direct pressure must also increase in the same proportion, which will therefore be:

$$d : dn = f : fn$$

This draft f corresponding to the plasticity of the material gives the formula:

$$fy = fx\left(1 + \frac{fx}{100}\right)$$

$$fy = fx + \frac{fx^2}{100}$$

in which fx is the given draft, fy the draft sought for, both in percentage. This gives us the draft coefficient k:

$$k = 1 + \frac{fx^2}{100}$$

If, for instance, the coefficient $k = 1.2$, corresponding to a draft $fx = 20$ per cent., the draft fy in the following pass would be:

$$20 + \frac{20.20}{100} = 20 + 4 = 24 \text{ per cent.},$$

which corresponds to the coefficient $k = 1.24$.

The Question of Reheating.

If a mill is of a size that permits the draft given by the formula $\frac{fx^2}{100}$ to be maintained from the beginning to the end of operation, reheating is absolutely useless. It has been found that the temperature of material coming from the finishing pass is the same whether it has been rolled in one, two or three heats. The material rolls much cleaner in one heat and shows a greater tensile strength. If the material is reheated the engine has at first less work, but correspondingly less heat is given to the material, which therefore chills more rapidly, whereby the advantage of reheating is lost. It is generally impossible to take advantage of the reheating by increasing the draft, since the latter is limited by the diameter of the rolls and by the maximum draft being reached. The draft given by the formula $\frac{fx^2}{100}$ should therefore be used not only in the finishing, but also as far as possible in the roughing rolls. This practice is not general, as the roughing rolls, being usually arranged for as many different sections as possible, can only make a light draft in each pass. In order to make a heavier draft possible it is recommended to have fewer passes on the roughing rolls and, in case the last pass on the same should not be suitable, to have either an intermediate

pass in the finishing rolls or else an extra roughing stand, in order not to lose the advantage of rolling in one heat. For this reason diamond shaped passes in roughing rolls are the most unsuitable, since it is impossible with them to give a greater draft than $f = 30$ per cent. Such passes in large sizes grip very badly and are only to be recommended for small squares and rounds. Roughing rolls in which the material is rolled alternately flat and square grip more easily and are better, while best of all is a movable upper roll, as used in blooming mills. With this arrangement the upper rolls may be raised or lowered at will, any desired dimension can be easily obtained, and the further advantage is gained of always working with a heavy draft and consequent small loss of heat. The maximum thickness of bloom which can be worked in one heat is limited by the mean diameter of the rolls. The approximate practical limit is a square bloom, of which the side B is equal to half the mean diameter of the rolls—that is:

$$B \text{ max.}^2 = r^2$$

Limits of Length.

The length which can be rolled in one piece is limited by the amount of heat lost during the process. The heat lost is dependent: 1, on the draft f; 2, on the style of the mill (two-high or three-high); 3, on the circumferential speed S of the rolls per second; 4, on the time taken by the piece to pass the rolls. To avoid this injurious cooling it is necessary to increase the speed of the rolls or to roll shorter pieces—that is, the speed of the rolls S per second must be proportional with a given draft to the length l of the piece rolled. The length l should be such that the steel leaves the finishing pass with such a degree of heat that, when cold, it shows no redness (oxidation). This corresponds to a finishing temperature of about 900 degrees C. By dividing the length so obtained by the speed of the rolls S per second a figure, v, is obtained, which varies with the amount of the draft f and also with the style of the mill (two-high or three-high). Retaining the draft coefficient obtained from the $\frac{fx^2}{100}$ formula, this figure proves to be on the average:

$v = \frac{fx}{4}$ for ordinary two-high mills.

$v = \frac{fx}{2}$ for three-high and reversing mills.

If, therefore:

S = circumferential speed of the rolls in feet per second;

l = length to be rolled in feet;

v = a figure obtained as above being $\frac{fx}{4}$ for two-high and $\frac{fx}{2}$ for three-high;

we obtain the following:

$$S = \frac{l}{v};\ l = S \times v;\ v = \frac{l}{S}$$

If, therefore, S and l are known, v may be calculated, and from v the draft f can be arrived at, the latter being:

For two-high mills..... $f = 4\ v$

For three-high and reversing mills.... $f = 2\ v$

From the above the draft coefficient k can be obtained, being respectively:

$$k = l + \frac{4\ v}{100} \text{ and } k = l + \frac{2\ v}{100}$$

The draft f, which is fixed on for the last reducing pass, amounts usually to 20 to 30 per cent. From this we get values, v, which correspond to those found from practical experience:

$v = 5 — 7.5$ for two-high mills.

$v = 10 — 15$ for three-high and reversing mills, according to the method used to obtain the finished section.

Influence of Temperature on the Tensile Strength of Steel.

In order to determine the influence of rolling temperature on the tensile strength several ingots were cut in two. One piece was so strongly heated and so rapidly rolled that the rail therefrom left the rolls at a bright red heat. The second piece was not heated so hot and rolled colder, leaving the rolls at a dark red heat. From the rails obtained tensile tests were made, with the results shown in Table III:

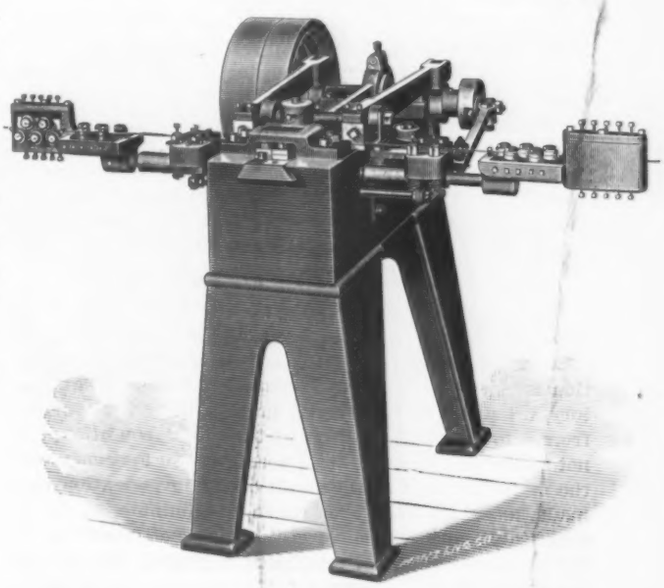
Table III.

	Size of test piece.			Breaking strain.	Elongation.
	Length. Inches.	Dimensions. Inches.	Area. Square inch.	Pounds per square inch.	Per c't.
h	7.874	0.787 diam.	0.4869	73,904	16.10
c	7.874	0.787 diam.	0.4869	81,229	7.40
h	7.874	1.181 x 0.3937	0.4650	73,406	10.35
c	7.858	1.181 x 0.3937	0.4650	81,200	7.20
h	7.874	1.181 x 0.3937	0.4650	77,402	21.80
c	7.874	1.181 x 0.3937	0.4650	81,200	10.50
h	7.874	1.181 x 0.3937	0.4650	77,047	23.90
c	7.874	1.181 x 0.3937	0.4650	84,058	16.20

From the above it may be seen that the temperature of rolling has considerable influence, and that the result of colder rolling was a decrease in elongation, while the tensile strength became greater. In all cases the coefficient of quality of the hot rolled material was higher than that of the cold rolled.

The Hoefer Double Acting Staple Machine.

The new Hoefer staple making machine is built upon a novel principle in that it is double acting, producing a staple on the return stroke of the dies as well as on the forward stroke. As may be seen from the illustration, the general action of the machine is upon the slide and plunger principle. Wire stock is fed to the dies alternately from each side, the arrangement being such that the two wires may be of different sizes. The lengths of the staples made from both sides must be alike, however. This feature of providing for utilization of both strokes in producing two staples for each rotation of the actuating shaft is believed to give the machine considerable advantage over the older single acting types by practically doubling the output of one machine. For a speed of 200 revolutions per minute the machine produces 400 staples per minute, equivalent to 24,000 per hour. The machine is also arranged to cut anchor barbs on netting or blind staples as they are produced. The construction is described as being very simple, with provisions for adjustment to suit different sizes of wire and various lengths of staples. Two sizes of the machine are built by the makers, the Hoefer Mfg. Company, Freeport, Ill. The smaller size is designed for making netting and blind staples, while the larger machine is particularly adapted for fence staples.



THE HOEFER DOUBLE ACTING STAPLE MACHINE.

Dispatches from Berlin state that it has been decided to amalgamate the Allgemeine and Union Elektricitaets Companies, which had already formed a working agreement. The Union Company's 24,000,000 shares will be transformed into 16,000,000 shares of the Allgemeine shares, making the capital of the latter $19,000,000.

Report of the Secretary of the Navy.

Recommendations of Special Interest to Government Contractors.

WASHINGTON, D. C., December 8, 1903.—The annual report of the Secretary of the Navy, which has just been transmitted to the President, is notable for the suggestion of a number of reforms in the organization of the Navy Department with a view to increasing its efficiency in the time of peace as well as in war. The Secretary also makes important recommendations with regard to the steps to be taken to expedite the construction of vessels by contract, the repair of ships in commission, the installation of steam turbines in several war vessels for experimental purposes, the improvement of the facilities of the Government for the manufacture of ordnance and the authorization by Congress of new vessels. Following is an abstract of the Secretary's report:

Reorganization of Department.

The various proposals for the reorganization of the Navy Department, which have recently been advanced, may be classified as follows:

1. Alterations in the organization of navy yards which will increase the power and responsibility there over and for work progressing therein. 2. The consolidation of the bureaus in the Department. 3. The creation of a general staff, which shall be responsible for the efficiency of the vessels afloat and the *personnel* of the navy, and act as the military adviser of the Secretary, having no authority except such as may be conferred upon it from time to time by the Secretary. It is not proposed to recommend specifically at this time any of these proposals, but only to bring them forward for the earnest discussion and consideration which their importance deserves.

To Expedite War Vessel Construction.

In the last annual report of the Secretary of the Navy reference was made to the fact that the general progress of work upon vessels under construction by contract, particularly those of the larger class, had not been satisfactory, all such vessels being in arrears in periods varying from 4 to 29 months. Finding that these conditions did not materially improve, the Department in February took the matter up, and as the result of the investigation then made, measures have been taken to eliminate, as far as practicable, such of the several concurrent causes of delay as are within the Department's control. To this end steps were taken to secure: 1. The preparation hereafter of adequate plans before awarding contract. 2. The avoidance of changes in the disposition of armor, armament or details of design after award of contract. 3. There is now on hand in shipyards, in advance of the needs of builders, a very considerable supply of armor. The item of ordnance, however, remains a serious question. The ordnance establishments of the Government, working to their full capacity, are incapable of promptly supplying the guns soon to be required by the seven battle ships and armored cruisers and the three protected cruisers of large size now under construction. 4. Instructions have been given by which inspecting officers and contractors have been kept alive to the necessity of avoiding delays from irregular or unsystematic inspection. The official reports show that during the past fiscal year 250,720,754 pounds of steel material were inspected, as against a total of about 212,242,000 pounds during the previous fiscal year.

It is believed that the foregoing causes of delay, with the exception of the item of ordnance, have been minimized, and that if adequate provision is made to arm the vessels when ready for their armament, delays from the causes above enumerated, all of which are more or less under the control of the Government, will not hereafter prove serious. Delays are, however, due also to circumstances not directly, if at all, within departmental control, such as: 5. Dilatory deliveries of steel and other structural materials by subcontractors. 6. Lack of training and experience in the technical staff of contractors undertaking for the first time to build naval vessels. 7. Particularly since the year 1898, the inadequate supply of skilled workmen has caused embarrassment. This is a difficulty which the contractors have not been able successfully to remedy by the offer of higher wages.

Notwithstanding the youth of the steel shipbuilding industry in this country, and in spite of the obstacles enumerated, and without making allowance for strikes or other interruptions beyond the control of the contractor or the Government, the actual average time consumed in the construction of a battle ship, for example, is not believed to be materially greater in the United States than it is in foreign countries where the best results have been obtained. From date of contract to date of first commission, in the case of the English battle ship "Russell," four years and one month was consumed, and in the case of the German battle ship "Wittelsbach," now building, more than that length of time has elapsed. The ten battle ships heretofore built for our navy were constructed within the average period of four years and eight months. When due allowance is made for inherent difficulties, this is a result creditable alike to the officers charged with the duty of designing and constructing and to the shipbuilding establishments of the country.

Repairs to War Ships.

There is nearly always something about the complicated mechanism of a naval vessel that needs attention, and when at a navy yard the temptation to take advantage of the opportunity to make and continue repairs is natural. After obtaining an expression of the views of the Bureaus of Navigation and Construction and Repair in the matter, the Department has directed that hereafter the principal vessels of the North Atlantic squadron shall not be required to visit a navy yard for docking or repairs, under ordinary circumstances, more than once a year. While this order was issued with respect particularly to the North Atlantic fleet, it is understood to apply equally to all vessels of the navy, and it is believed to be a decided step not only in the direction of efficiency, but of economy as well.

Steam Turbines and Electrical Appliances.

The Bureau of Steam Engineering is giving attention to the question of installing steam turbines in certain classes of naval vessels. Turbine development represents the distinct and special advance that has been made in naval engineering during the past few years. Great Britain, Germany and France are preparing to install turbine motors in naval vessels. In order that our navy may participate in the advantages attending the rapid and efficient development of this type of motor, the question of authorizing the equipment of one or more vessels therewith is commended to consideration.

A marked feature of recent construction is the widening sphere of usefulness, both at naval stations and on shipboard, of electrical appliances. The Bureau of Equipment reports that a total of $589,801.35 was expended during the year upon electrical appliances. The auxiliary service on board ships of war now includes, among other items, ventilation by electrically actuated fans; the closing of water tight doors by electrically operated mechanism, with distant control; electrical steering apparatus, electrical devices for handling boats, portable searchlights for use at naval stations and in connection with coast defense and advanced naval bases, and a new system of battery fire control, by which the guns of the larger vessels are divided into groups, each group including guns of practically the same nature and having the same arc of fire.

Facilities for Gun Manufacture.

It requires practically as much time to manufacture the armament of a battle ship as to build the vessel, but work upon the batteries of 12 important vessels authorized, contracted for, or under construction has not yet been begun. The Naval Gun Factory has been working to its full capacity, employing two and occasionally three successive shifts of men and keeping its principal tools in almost constant operation day and night during the past year. Notwithstanding this fact, the output of guns falls short of the requirements of the service. In January, 1907, the last of the ships authorized by Congress will be due. It is computed that at that time, with the present capacity of the gun factory, "the delivery of the

last 8-inch guns for these vessels will be about eight years behind the date of completion of the last vessel."

The Department, in April last, appointed a board to investigate and report upon this matter. The board, after a careful inquiry, recommended an enlargement of the gun factory sufficient to meet current demands. The Department, however, concurs with the Chief of the Bureau of Ordnance in the conclusion that the judicious course to pursue is to get as much work as practicable out of the gun factory as it is, with such additions and improvements as are absolutely necessary to maintain its maximum efficiency; to seek such aid as can be given by the United States Army gun factories at Watervliet, and, as a last resort, to contract, as far as it may be found prudent so to do, with private establishments capable of doing work of this character. It is believed that by the latter expedient the gun factory may be relieved of a considerable amount of work upon accessories, such as gun mounts and the like, which can be built, in whole or in part, in private establishments, and that by resorting to all three measures of relief the necessary armament for the new vessels can be provided as will be required, without costly enlargement of the plant at the Washington Navy Yard.

Armor Tests.

The armor manufactories of the United States, in accordance with promise, have added to their facilities, and deliveries amounting to 11,493 tons have been made —a marked increase over any previous year. Armor plates are now tested with capped projectiles. The acceptance tests for armor piercing projectiles have been made more rigorous, it being now required that they shall, at a prescribed velocity, perforate unbroken a plate of hard faced armor equal in thickness to the diameter of the projectile, and then be in a condition for bursting.

Increase of the Navy.

With regard to increase of the navy the Secretary says: "Careful consideration given last year to the question of the continuance of naval construction confirms me in the views expressed in my last annual report that the upbuilding of the navy should be continued by the annual authorization of new vessels."

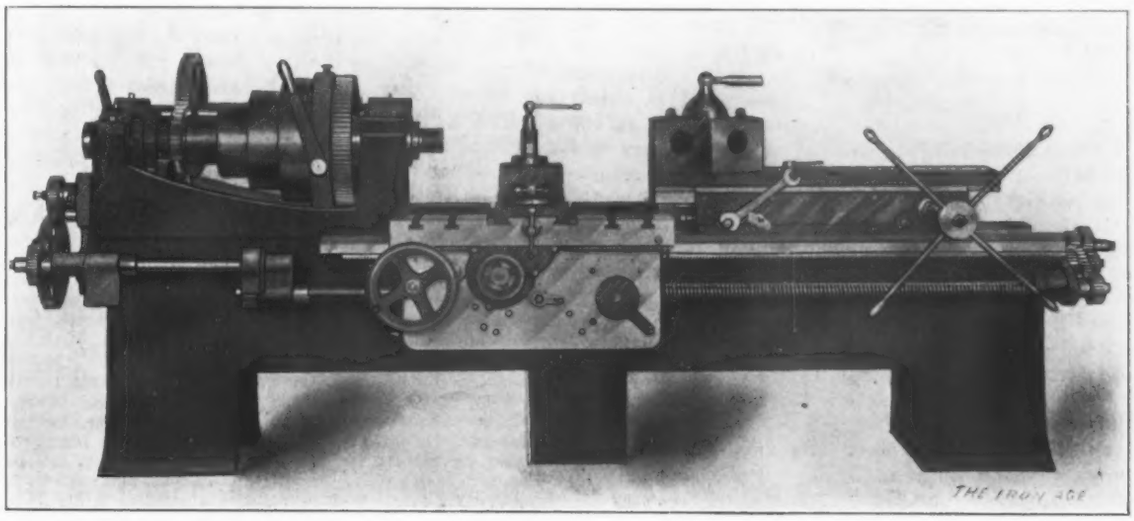
The Secretary submits a table in which the valuation of the total property of the United States is compared with the naval expenditure for a series of years. The expenditures for the fiscal year 1903 were $82,61o,034. By reasonable approximation the property valuation for that year was $106,239,266,872. Thus there was expended for this year for each dollar of the national valuation $0.00077. If the average of the last century had been reached the expenditures would have been $130,674,298.25.

W. L. C.

In a recent paper upon "The Effect of Modern Accessories on the Size and Cost of War Ships," a British naval constructor points out the numberless ways in which trifling items go to swell these features in modern designs. One of the many things to which he refers is the matter of paint, the enormous weight of which might well appear incredulous to any one who has not seen the records. The most serious feature is that the process never ceases, and the greater the pride in the ship "the greater the tendency to sink her with white lead." He mentions a case in which there was removed from the inner surface of the crew space of a destroyer paint of a weight of over 2 pounds per square foot of surface. This is merely one instance of how lavishly weights are piled on where there exists no real necessity for them.

The New Draper Turret Lathe.

In this tool a massive hexagon turret is mounted upon the lathe shears in place of a plain tail stock, which latter is furnished if desired, and may be used instead of the turret when the machine is wanted as a simple engine lathe. The massive character of the turret has been dictated by the desire to meet the requirements of such heavy work as chasing pipe threads, a lead screw in the base being provided also to assist in this operation by enabling the taps and dies to engage properly with the work. This turret lead screw is connected to the regular carriage lead screw and driven from it by a sliding key and a nest of gears seen at the tail end of the bed. This nest of gears are so arranged that the turret lead screw may be rotated either at the same speed as the carriage screw or at speeds twice or four times as great. Thus the turret may cut threads of pitch equal to those which would be formed by a tool mounted upon the carriage in the usual way, or may cut pitches one-half or one-fourth as coarse, all for one change gear arrangement at the head end of the carriage lead screw. Feed of the turret is engaged or disengaged by an open and shut nut operated by the handle on top of the turret slide just back of the turret proper, as seen just at the upper end of the open end wrench in the illustration. The turret head is 14 inches across the faces of the flats, in the 24-inch lathe illustrated, and may be furnished with holes bored to a maximum diameter of 3⅛ inches. The turret base is 34 inches long; the slide has a length of 44 inches and an extreme travel of 20 inches, of which 3¼ inches are used in automatic revolving of the turret head.



THE NEW DRAPER TURRET LATHE.

The lathe is driven by a four-step cone, 16 inches in diameter at the largest step, and designed for use of a 4-inch belt. The cone is connected to the spindle by a powerful friction, and the back gear is locked in its operating position by a positive toothed clutch, thus affording very powerful driving, all under control of the hand lever seen at the front of the head stock between the cone pulley and the large spindle gear.

The Draper Machine Tool Company of Worcester, Mass., are designers and builders of this new lathe.

Notes from Great Britain.

The Markets.

LONDON, November 28, 1903.—There can be no doubt that trade is slackening to a serious extent, and this quite apart from international competition in iron and steel. A sure indication of this is the contraction both in market value and earning powers of British railroads. Again, the iron and steel works in Barrow-in-Furness and district are so seriously slack as to cause a considerable amount of distress. The steel works have been closed this week, and it is not thought that there will be any active resumption of work before the New Year. At the iron works only four furnaces out of 12 are in blast, while the men employed on the Furness Railway Company's works are on short time.

Hand to mouth buying is still the order of the day, and consumers are masters of the situation. Standard quotations have ceased to bear any real relation to actual prices, and there is no use quoting them. It is merely a case of one cut in price succeeding another. The United States Steel Corporation are still feeling their way, but British and German manufacturers are at the moment offering at severely competitive prices, with the result that American agents are really taking very little hand in the game. It is evident that until the turn of the year buyers will make no important contracts, unless the Germans should make special offers, which is not altogether impossible. A change has come over the Westphalian iron and steel trade during the past month, and prices are rapidly falling in that district. There is a general anxiety in Rhenish Westphalia as to the future, so that the situation may be forced more quickly than one can foresee at the moment. Nor is the position any easier owing to the increased German output. According to the report issued by the Association of German Iron and Steel Masters the production of pig iron in the German Empire (including Luxemburg) amounted during the month of October, 1903, to 869,463 tons, against 742,502 tons in 1902 and 645,127 tons in 1901. The total output during the first ten months of this year amounts to 8,394,056 tons, against 6,917,737 tons last year.

Americanizing British Plants.

At the annual meeting of the Cleveland Institution of Engineers, held a few days ago, the question of the "Americanization" of English iron and steel plants was discussed. The president, F. H. Marshall of the Tees Iron Works, Middlesbrough, referring to the great changes now going on in iron and steel works in this country, deprecated anything like inconsiderate following of American examples. His admonition was supported in the course of the discussion which followed the address by another member of the institution, who urged that the American habit of incontinently scrapping present machinery or plant as soon as something new had appeared was probably as erroneous as the opposite course, often pursued in this country, of being too dilatory in making changes. There can be no doubt that very important improvements are going on in British blast furnace and other iron and steel plants, but it is difficult to believe that there is much danger of thoughtless or undue haste in adopting new methods, American or other.

Steel vs. Iron

The dismantling by manufacturers of sheets and strip in the Midlands of iron puddling furnaces, for which no further use is anticipated, has led to an interesting statement by an iron manufacturer, who in part says:

> My experience is that galvanized roofing sheets made of iron last three times as long as those made of steel. After five years I find the latter are worn out and require renewing, whereas, under exactly similar conditions, iron sheets have lasted 15 years. I have had the same experience with steel boiler plates, and as the result nothing except the impossibility of getting them would induce me to use anything but iron plates in future. So also with tubes made from steel strip, the oxidization that takes place is so rapid and severe that they cannot be kept in stock, especially if exposed to any damp, for any length of time without serious deterioration; and for use under ground, and for conveying steam or water, they are found to be much shorter lived than when made of iron. I find also that eminent engineers are, in some important cases, again specifying iron for use in the construction of piers and bridges; and water tanks that have been made of steel plates for many years without objection are now ordered to be made exclusively of iron. Water, and especially sea water, is found to be most destructive of cheap modern steel; and although structural work in iron costs fully 10 per cent. more to start with, it lasts far longer, and is consequently much cheaper in the end.
>
> I am fully aware of the fact that steel is much easier and more economical to roll, especially into sheets for galvanizing, and yielding a smoother surface presents a better appearance externally, but however advantageous this may be to the manufacturer, it will not compensate the consumer if his roofs and buildings will only last one-third as long. Many years ago I remember hearing a then well-known and very practical South Staffordshire ironmaster tell a friend who was extolling the superior virtues of steel over iron for the manufacture of boilers to wait 20 years, before when, he predicted, steel would have been "found out," and we should have to go back to iron. Sufficient time has now elapsed for it to have had a thorough trial, and the interesting question therefore is—Has it been "found out?" I am disposed to render my answer in the affirmative, but should like to become acquainted with the views and experience of others.

Canadian Dumping.

Walter S. B. McLaren, a director of three large iron producing companies in Great Britain, who between them make one-tenth of the total amount of British pig iron produced, has turned the tables upon the preferentialists in an amusing, but none the less effective, manner. Inasmuch as the new fiscal tariff has been framed in the interests of trade between Great Britain and the colonies, and further, inasmuch as "dumping" has become the *bête noir* of the fiscal changer, it has never been anticipated that Canada would be the first to dump; yet so it is on the authority of Mr. McLaren, who says:

> The position of Canadian pig iron is strictly analogous to that of bounty fed sugar. The Canadian Government for some years has given a bounty of $3 a ton, or say 12 shillings, on all pig iron made in Canada from Canadian ore; not a bounty on the pig iron exported, but a bounty on the total amount made. It has given a further bounty of $3 more on steel made from Canadian iron. In consequence of the advantage of this bounty, which has now been reduced, I believe, by about 1 shilling, the Canadian ironmasters have exported Canadian pig iron to this country, and have sent us, or, to use the current phrase, have dumped upon us in the years 1901-02 nearly as much iron as Germany, Holland, Belgium and America put together. The actual figures are for those two years, Germany, Holland and Belgium, 78,615 tons; America, 45,973 tons, and Canada, 103,202 tons. This surely is dumping with a vengeance, and is unquestionably due to the benefit which the Canadian makers derive from their bounty.

Walter McLaren not unnaturally asks whether, if legislation is to take place against dumping, it will apply equally against British Colonies.

The Russian Industrial Situation.

Official reports from St. Petersburg as to the industrial condition of Russia are at the present time incurably optimistic, but there is reason to doubt their accuracy. We are told in these reports that the harvest has been more than usually abundant, that many mines have been reopened, that new markets have been found for Russia's surplus products, that the export trade is unusually satisfactory and that labor agitators have been effectually squelched. A well informed Russian correspondent states that these reports need qualification. The most that can be said for the general harvest in 1903 is that it compares favorably with the average harvest for the last 15 years. South Russia has been especially favored, and it is anticipated that the export of grain from the Black Sea will prove a bumper. On the other hand, in many Russian districts the absence of rain and the long period of hot sunshine have between them baked vast agricultural tracts.

The metallurgical side of Russian industry is of more concern to readers of *The Iron Age*, and here again we have to accept with many reservations the glowing optimism of St. Petersburg reports. It would seem as if the increased home demand, which the Government has been working for and anticipating, has not yet materialized. The aggregate quantity of coal, iron and steel marketed with the Empire itself during the year ended in September shows, according to the returns, an increase of only some 7 per cent. over the total quantity for last year—itself none too prosperous. For the increase in rails, bridge sections, building plates and angles the Tashkent Railway, several railway extensions in the

home governments, and the St. Petersburg, Nikolaieff, Sormovo and other Government and private shipbuilding concerns, nearly all working at abnormal pressure, more than amply account. The question of the immediate future of the mining, metallurgical and other industries in South and Southeast Russia, just as in other areas, is really at the moment a very debatable one. Few, however, have any doubts as to the baneful influence exercised on these industries in particular by the syndicate system, which is more in evidence than ever in Russia to-day. Strictly speaking, certain forms of "syndication" are illegal in Russia. But not a few things are illegal in Russia, and yet practiced right and left with little attempt at secrecy. In spite of the assertions to the contrary, no new markets of any importance have been secured abroad, either for South Russian coal or metallurgical products, nor is there convincing ground for concluding that such markets will be obtained until, at any rate, the cost of railway haulage to ports of export are markedly reduced. The railway managements, on their part, declare that any considerable reduction of the tariff on minerals and heavy manufactures is out of the question for the present.

Shipbuilding Notes.

The death took place this week of John Pile, in his eighty-fourth year. He was one of the pioneers of the shipbuilding industry, in which he had been engaged since 1836. More than 50 years ago he was noted for the building of beautiful clipper ships, which made record passages to the Far East. Mr. Pile was in partnership with his father, brother and others at Sunderland, Stockton, and latterly West Hartlepool, where, in association with Joseph, Spence, he had one of the largest shipbuilding yards in the kingdom. They built the first steamer—the "Atalanta"—admitted to trade in Japanese waters, and the "Asie," the first vessel that passed through the Suez Canal, was built by them.

This week was launched from the Harland & Wolff yard in Belfast the largest ship in the world, to be known as the "Baltic." It is interesting to note that this has been the fourth time the same firm have launched a vessel entitled successively to being called the largest in the world. First there was the "Oceanic" in 1899, then the "Celtic" in 1901, then the "Cedric" in 1902 and finally the "Baltic." The dimensions of these vessels may be worth record:

	Gross tonnage.	Length. Feet.	Depth. Feet.	Breadth. Feet.
"Oceanic"	17,274	705	49	68
"Celtic"	20,904	700	49	75
"Cedric"	20,980	700	49	75
"Baltic"	23,000	725.9	49	76.6

The "Baltic" has a displacement of 39,800 tons, while that of the Hamburg-American liner "Deutschland," which, with the exception of the "Kaiser Wilhelm II," is perhaps the largest vessel in the world, outside the White Star Line, is only 23,200. The dimensions of the "Deutschland" are: Length, 684 feet; breadth, 67 feet; depth, 40 feet, and gross tonnage, 16,200. The "Kaiser Wilhelm II" is somewhat larger than the "Deutschland," but the only point in which she will excel the "Baltic" will be in speed.

The new turbine passenger steamer "Brighton" established a record on Wednesday last when she succeeded in passing the pierhead at Dieppe 2 hours and 59 minutes after leaving Newhaven Piers, a distance of 64 knots, or 75 miles. This represents an average speed of 21½ knots (25 miles) per hour, and it is highly creditable to Denny Brothers, the builders. The "Brighton" is probably the fastest passenger boat in the English Channel, and certainly the most luxurious in her saloon and cabin appointments.

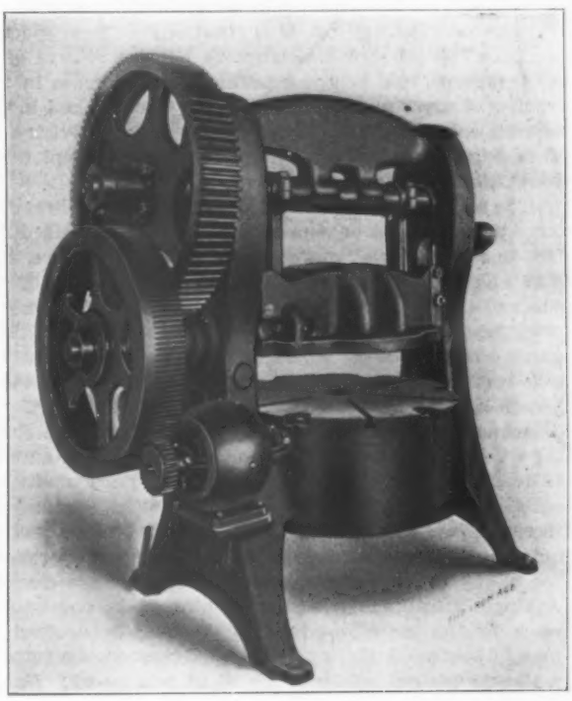
The old battle ship "Inflexible," which cost the Government £795,268, has been sold as scrap for £20,100. T. W. Ward of Sheffield is the purchaser. This gentleman has made himself famous for speculative enterprises of this description, and he seldom makes a mistake.

S. G. H.

The Youngstown Machinists.—In all probability the machinists employed in the shops in the Youngstown, Ohio, district will be asked to accept a reduction in wages running from 10 to 15 per cent. The present scale of the Machinists' Union expires on December 17, but before that time notice of a proposed reduction will be placed in all the principal shops in the Youngstown district. Nearly four months ago the machinists were given an advance ranging from 5 to 10 per cent., with the understanding that if at the expiration of four months trade conditions did not warrant a continuance of the advance a conference would be held and a new scale of wages arranged. The shops where the reduction will go into effect are the William Tod Company, the Lloyd Booth department of the United Engineering & Foundry Company, the George B. Sennett Company, Mahoning Foundry & Machine Company and others.

Motor Driving of Punches and Shears.

Attachment of motors to machines and tools of various kinds has become so common a matter that interest in connection with an electrically driven machine has reduced itself to a question merely of the method of mounting and connecting the motor and its gearing. Furthermore, the electrical driving of individual machines by separate motors presents two distinct phases, depending upon whether the problem is one of construction of a new machine or the adaptation of an old one. It is safe to say that not often does a machine already in use, driven by belt, lend itself readily to motor attachment without the use of more or less special alterations or the employment of features which would be eliminated were the machine newly designed with this method of driving in view. Certainly a notable exception to this statement—and presumably several other classes of tools may come within the same category—is the general line of punching and shearing machinery, wherein the rim of a heavy fly wheel is available for use, as shown in the illustration. Here is a Ferracute notching press, a standard item of the product of the Ferracute Machine Company, Bridgeton, N. J., to which tool has been directly attached a motor constructed by the Northern Electrical Mfg. Company, Madison, Wis. No amplification is necessary relative to the method of connecting the motor nor of the general availability of the method to a wide range of machinery. In case of any tool of this class it is simply necessary to arrange any suitable bracket device by which the motor may be mounted, so as to bring the pinion upon its armature shaft into mesh with teeth



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cut upon the periphery of the fly wheel. The rearrangement of the drive for a given machine may largely be effected without interference with its regular work, only the cutting of teeth in the fly wheel actually compelling the stoppage of output for a period of time varying with the machine shop facilities available. Temporary substitution of another fly wheel nearly enough like the regular one to serve for a short time may readily remove necessity for any material break in the operation of the machine.

Hearth Area and the Number of Tuyeres in Iron Blast Furnace Practice.*

BY F. L. GRAMMER, BALTIMORE, MD.

The rapid advances on the mechanical side of blast furnace practice have not always been accompanied by a proper appreciation of the metallurgical requirements. This is illustrated occasionally by the improper use of automatic barrow charging devices, and bins (introduced at the expense of accuracy in weight) with ores of irregular composition or ores that have been poorly graded. The 100-foot blast furnace has not always been advantageous, and in many instances the increase in the number of tuyeres from 8 or 12 to 20 has resulted in decreased output. The data pertaining to this division of blast furnace practice are now sufficiently complete to allow inferences to be made.

The use of fine ores has indicated the manner in which large outputs could be obtained, as it has emphasized the fact that intimacy of contact between gases and ore, and coke and air, were more important than the time of exposure. It was reasonable to suppose that if more points of contact were made between the air and the coke their union would occur in a shorter period of time, and the coke would be burned more rapidly in the same sized hearth and an increased output thereby obtained. In consequence of this theory many furnacemen upon relining a furnace increased the number of tuyeres from 8 or 12 to 20, or even more, frequently with unfortunate results. If the number of tuyeres in an old furnace is increased while it is in blast and banked there will be quite an increase in the output on resuming operations for a day or two, owing to walls having been cleaned. A single advantage which was obtained in one or two cases by the use of multiple tuyeres has been offset by many disasters, and, in at least one instance, the furnace wall was cut out within a period of two weeks. Unless the penetration of the blast is properly calculated there is danger that it will go through the center or up the walls of the furnace.

Apart from the increase in the number of tuyeres, the points of horizontal contact also were increased by "oval" tuyeres, "three-way" tuyeres, and a very ingenious "fan spraying nozzle," which has been described in *The Iron Age*, November 25, 1897. These patented tyueres, while hardly accomplishing the object for which they were designed, are not without merit. I have used the three-way tuyere very advantageously on furnaces having a dirty crucible or having a lodgment on the wall, and by its use I have obtained a clean hearth. Owing to certain objections, however, these devices have never been extensively adopted in regular furnace practice, for if increasing the number of tuyeres had shown more benefits the practice would have been more widely adopted. The metallurgists of the present generation have experimented with the number of tuyeres used, but no one, so far as I know, has had the temerity to place them in more than one horizontal plane in the last ten years. The number of tuyeres required in an iron blast furnace must be determined from the hearth diameter, the fuel and ore used, and the grade of metal desired.

Taking up first the subject of blast pressure: In a furnace having an 8-foot hearth the average distance through which the air at one point has to travel in order to cover the whole hearth area is the distance from the nozzle to the center of the area, or 4 feet. If the air is introduced at two points, the distance is $0.5756\ R =$ 2.3024 feet; at four points, $0.4\ R = 1.6$ feet; at eight points, $0.3482\ R = 1.3928$ feet; at 16 points, $0.3376\ R = 1.3504$ feet; and at an indefinite number (continuous), $0.3333\ R = 1.3333$ feet.

As far as assisting blast pressure is concerned, with a hearth of the same diameter, much relief in reducing the pressure cannot be expected beyond the use of eight tuyeres. Indeed, the pressure necessary to overcome the resistance offered, as represented by the distance from the circumference to the center of the area, will be greater in proportion to the number of tuyeres, because of the greater friction offered by the smaller and more numerous channels which convey the air through the crucible. The 3 per cent. assistance rendered by decreasing the distance from $0.3482\ R$ to $0.3376\ R$ is more than offset by the increased friction. The usual experience in using coke and a moderate quantity of fine ore is that, for the same volume of air and the same hearth area, the blast pressure with 16 tuyeres will be from 1 to 2 pounds higher than with eight tuyeres.

Using from 16 to 20 tuyeres usually means that the fewer tuyeres are lost at scattered intervals by the splash or the drilling of molten iron; the tuyeres wear out rather than burn out, and when one is destroyed the others follow quickly. With a larger number of tuyeres the settling of the charge is apt to be more even than with fewer tuyeres. Also, the dripping of the iron is less marked at any one tuyere. An observation through the peep sight in the tuyere stock shows that the activity of the movement of the coke is noticeably less with 20 tuyeres than with ten, the volume of blast being the same in both cases and the diameter of the tuyeres being such as to give the same penetration of the blast. However, a few extra tuyeres are of advantage when the furnace is working irregularly, as it is very easy to plug the extra tuyeres with clay when not needed. Appreciating the fact that it is safer to have extra tuyeres, the tendency—even where no dreams of great benefit exist—is to increase their number.

For a given hearth area the number of tuyeres that should be used is best determined by a comparison with the workings of a furnace of similar dimensions and engine equipment, operating under similar conditions of ore, flux and fuel and grade of metal produced.

Excellent results have been obtained with Lake Superior ores in an 85-foot furnace having an 11 or 12 foot hearth and eight tuyeres. For the purpose of illustration, assume an 11-foot hearth, having the tuyeres uniformly spaced; in this case each tuyere of equal diameter will cover an area of $\frac{\frac{\pi D^2}{4}}{8} = 11.87$ square feet, or, for all practical purposes, 12 square feet. If it was decided that the engines and stoves permitted a 14-foot hearth, $\frac{\frac{\pi D^2}{4}}{11.87} = 13$ tuyeres would be the proper number to have, and on account of columns, it is probable that 12 or 14 would be the number selected, the even number being more easily placed in the construction.

If with an 11-foot hearth and eight tuyeres a blast pressure of 10 pounds per square inch were produced, the pressure calculated for 14 tuyeres and a 14-foot hearth would be, as shown in the following formula:

$$\frac{7}{5.5} \times \left(\frac{3482}{3400}\right)^2 \times 10 = 13.2 \text{ pounds},$$

and adding 1 pound for increased friction, the final blast pressure would be about 14.25 pounds. Based on this reasoning, an increase in the number of tuyeres will be beneficial.

In the light of our present knowledge it is assumed to be desirable that the horizontal area exposed to a single tuyere, or to a unit volume of air, should be constant for the same stock used.

Immediately after tapping the iron, the coke from 6 to 12 feet below the tuyeres is exposed for combustion. As the level of the molten slag and metal rises the coke becomes covered, and the air must seek coke at a distance more and more vertically above the tuyeres, until at the flushing time the entire combustion, which has now be-

* A paper read at the New York meeting of the American Institute of Mining Engineers.

come decreased in intensity, is above the tuyere level. After flushing, the lower limit of the combustion zone drops to the level of the cinder notch, which is generally 2 feet below the tuyeres. It fair to assume that, at the same temperature of blast and with the coke of the same size and porosity, a unit volume of blast will attack a given volume of coke. Therefore, if the horizontal influence of a tuyere be restricted, and the blast volume remain constant, the vertical influence of the blast will be increased.

A hearth of small diameter means that the combustion zone extends to a greater hight in the furnace than if the hearth were wide and receiving the same volume of wind. It means, also, that the heat is somewhat more intense, as is shown later in this paper. This explains in some measure the fact that the silicon content of pig iron is usually higher with furnaces having a narrow crucible than with those having a wide crucible. In the former the dripping slag and metal remain longer in contact with the incandescent coke before reaching the bottom of the crucible, and a part of the coke is at a higher temperature than is usual in a furnace having a wider hearth.

I do not say that the consumption of fuel is better in furnaces equipped with a small crucible; because there are too many influences which act the other way. With a small crucible more heat is lost per ton of metal produced, on account of the heat conveyed away through the cooling devices; and in consequence there is less liability for the metal to break out. But, generally, small crucibles assist the assimilation of silicon, and furthermore, under ordinary conditions they can receive a hotter blast without stocking up the furnace than can the usual modern jumbo. On the other hand, the increase of the horizontal hearth area allotted to a unit volume of the blast should decrease the vertical hight of the combustion zone. If this be correct a 70-foot furnace would derive more benefit by increasing the number of tuyeres than would a 100-foot furnace, because, by decreasing the hight through which combustion takes place, we have practically added to the hight of the furnace, and for Lake Superior ores a 70-foot furnace is probably too low for best economy of fuel. An increase in the number of tuyeres is analogous to an increase in the area of horizontal influence.

My assumption, that each point in the horizontal plane of the hearth at the level of the tuyeres receives the same quantity of air, is probably exaggerated, even with coke. With a sticky fuel or with fine ores poorly distributed, it is quite certain that the air does not pass around the fuel as freely as water would fill the interstitial space in a pail filled with marbles. Under these conditions, the more contact possible between air and coke the better. Two reliable instances of marked improvement, resulting from an increase in the number of tuyeres without increasing engine power or hearth diameter, were obtained in a low furnace treating a charge of 75 per cent. Mesaba ore and in a furnace using anthracite fuel.

If small hearths assist to make high silicon iron, large hearths tend to make low silicon iron; in other words, an increase of the number of tuyeres tends to lower the silicon in the pig iron produced in the furnace.

With eight tuyeres, the tuyere is 0.3482 foot distance from the center of its area of control, which extends over the entire space in front of the tuyere. In a hearth 12 feet in diameter the deflection that air would have to one side, before it meets air from the adjacent tuyere, is shown in the following equation:

$$\frac{\pi\ 12\ (1-0.3482)}{16} = 1.53 \text{ feet} = 18.4 \text{ inches.}$$

or, with 16 tuyeres,

$$\frac{\pi 12\ (1-0.3376)}{32} = 0.78 \text{ foot} = 9.4 \text{ inches.}$$

Using a hard coke, no marked improvement or change could be expected by decreasing the wall of coke below 18 inches to 9 inches. Coke in a finely divided form, and anthracite of small sizes, would hardly find a thickness of 18 inches a barrier to the passage of air. This may explain why many have noticed no improvement in furnaces working under regular and healthy conditions of large and strong coke by increasing the number of tuyeres on the same hearth area.

In determining the size of hearth it is obvious that the character of fuel must be taken into consideration. A fuel with cellular structures, aside from its disadvantages in the upper part of the furnace, will burn more rapidly than one more dense. Coke having a cellular space of 45 cubic inches (a unit size), compared with charcoal having 150 cubic inches cellular space in same volume, certainly requires a different dimension for the hearth area. Of course, coke is not quite so far behind charcoal as the ratio of 45 to 150, because the combustion of coke is assisted by the great pressure under which these furnaces are operated. The hearth area, besides being controlled by the fuel, should increase in proportion to the additional volume of air deliverable by the engines, as well as to the heat obtainable from the stoves. It required nearly a decade to learn that an increase of 40 per cent. in the diameter of the hearth necessitated a 100 per cent. increase in the engine equipment of the plant, not to mention the stove capacity. The other features of the hearth, such as hight of cinder notch and iron notch, cubic capacity compared to total furnace capacity, &c., have been discussed in former contributions to the *Transactions*.

We have discussed the pressure, diameter of hearth and number of tuyeres, for metal of the same grade, using a constant and an increased blowing capacity; yet the selection of the most desirable diameter of hearth for a set of entirely new conditions is a problem which can only be settled empirically.

The present treatment of Lake Superior ores with Connellsville or hard coke in furnaces equipped with modern engines is to have a volume of air sufficiently large to fill the empty crucible once every two seconds. A unit volume of air attacks a unit volume of coke, presenting a constant area of surface; and it may be said further that, at the same temperature, the quantity of coke burned varies almost directly as the weight of air supplied. If the volume of air per pound of fuel consumed did not vary from 53 cubic feet, under the best conditions, to 120 cubic feet, in plants having leaky valves, poor engines and split stove castings, we could speak of volumes in place of weights.

In the year 1883 Mr. Witherow thought that at a temterature of from 1300 to 1500 degrees C. 140 cubic feet of air per minute, in a furnace using coke or anthracite, would produce 1 ton of cast iron in 24 hours; and using charcoal, 110 cubic feet of air per minute would produce 1 ton of cast iron. At the present time 85 cubic feet of air will produce 1 ton of cast iron under conditions similar to those just quoted. This difference is really very slight, considering the lower fuel consumption incident to the lower silicon content of the resultant cast iron, together with the richer and more easily reduced iron ores used.

It is known, also, that at higher temperatures iron dissolves more carbon—*i. e.*, makes richer iron, and, other conditions being equal, the iron will contain more silicon. Thus, in order to increase the percentage of carbon and silicon in the cast iron produced, the temperature of the furnace must be increased, which is accomplished by using less ore and a more siliceous slag.

It is known that the reduction of magnetites requires a high temperature of the gases escaping from the furnace, or that the gases should be rich in carbon monoxide and, consequently, the quantity of coke burned for a given unit of iron is greater than that resulting from the treatment of Bessemer ores. These remarks apply also to ferromanganese and to silico-spiegel in a greater degree; as the cooling effect of the descending stock does not reach so low in the furnace and, consequently, the temperature in the crucible is higher. The use of soft fuel which will dissolve in the top of the furnace means that more fuel will be required to do the work in the crucible.

A porous fuel, like charcoal, with the pores open and not sealed, as in coke, offers from eight to ten times the contact surface on a given weight of fuel for attack by the blast, and its combustion therefore occurs lower in

the furnace. The occluding power of charcoal causes it to ignite at a very low temperature. If it were desired to make an iron at a heat near to its freezing point, such as basic iron or forge iron, a fuel easily ignited (charcoal) would be advantageous, especially if cheap and abundant.

Schinz, in 1868, said that the one point about furnace lines of greatest unanimity of opinion is that wide hearths are better adapted to forge iron and narrow hearths to foundry iron. He also gives the calorific intensity of coke about 100 degrees higher than that of charcoal.

The better sorting of the ores, the more uniform quality of the coke and the more regular charging of the furnace have resulted in reducing the irregularity in the working and have diminished the demand on the heat of the crucible, consequently a smaller margin of heat in the crucible was permissible and the silicon content of the resultant cast iron became lower. The crushing of the ores and the lowering of the bosh has allowed the silicon content of the cast iron to be lowered without danger of increasing the sulphur content, or of having the charge stick on account of the larger ratio of lime to total silica content in the burden. These results have met with the approval of those interested in developing the practice of smelting Bessemer ores.

A wide hearth will contain a large quantity of molten metal, and, acting like a "mixer," it reduces any temporary irregularity in the composition of cast iron, thereby yielding a product of greater uniformity. A soft fuel with a dull luster, like charcoal, radiates and absorbs heat more rapidly than a hard fuel with metallic luster, like coke or anthracite.

In less than 30 years the ratio of hearth area to greatest bosh area has increased from 1-16 to 9-16, and the furnace capacity in cubic feet per ton metal produced has changed as follows:

Change in the Factors of Iron Blast Furnace Practice.

Time.	Place.	Cubic feet of furnace per ton of metal produced in 24 hours.	Remarks.
1854....	England	190	.....
1870....	England	380	Resulted from increasing the hight of furnace from original 45 feet to 75 feet and more.
1876....	United States	197	Hight of furnace from 65 to 75 feet.
1889....	United States	59	Lake Superior ores; smaller proportion of lump sizes; crushed more thoroughly; lower bosh; large volume of air.
1891....	United States	50	.....
1903....	United States	20 to 30	Mesaba ores; wider hearth; increased volume of air; lower silicon in iron.

The data given in the preceding table show that the fine size of the ore allows a lower silicon content of the pig iron produced and yields a better contact of blast, which permits an increased volume of air to be used and a corresponding decrease in the time of exposure.

Schinz says that the time of exposure in the reduction zone should be relatively 4.53 for spiegeleisen, 2.75 for foundry iron and 1.0 for forge iron. He says, also, that these ratios can be reduced by increasing the volume of air.

Gruner gives, as a desirable diameter for the crucible of furnaces using charcoal, 20 inches up to 9 feet, and for furnaces using coke, up to 10 feet. For furnaces using coke he gives the following cubic capacity of the crucible: Furnaces producing from 2 to 5 tons of pig iron in 24 hours, from 18 to 36 cubic feet; producing from 5 to 10 tons in 24 hours, from 36 to 62 cubic feet; producing from 10 to 20 tons in 24 hours, from 72 to 144 cubic feet; and producing from 40 to 60 tons in 24 hours, from 216 to 288 cubic feet.

Modern American practice is from 3 to 3.5 cubic feet of crucible capacity per ton of metal produced in 24 hours. Gruner says that for lean ores the size of hearth is greater per ton of metal produced than for rich ores. These early authorities are quoted merely to show their ideas on the subject.

Practically, for the same volume of air the silicon content of the resultant cast iron may be raised, or a more refractory charge reduced, by lightening the burden, an act which raises the zone of incandescent coke and usually increases its temperature. The temperature of the hearth also may be increased by raising the temperature of the blast. On the other hand, on those ores and other material which have not been proven to be as independent of time exposure as are Lake Superior ores, the inclination is to use a lesser quantity of blast, which suggests a smaller hearth diameter commensurate with the reduction of blast, in order to give a longer time of exposure.

For porous materials like charcoal, conditions opposite to those for coke hold, and being soft, it requires a smaller hearth, because of the pressure of the superincumbent charge and because it offers so large an area of surface contact for attack.

For hard, dense materials like coke, offering fewer surfaces of attack on a metal requiring small fuel margins, such as basic iron, a shape of furnace is desirable which will allow the quick removal by the rising gases of the heat generated, and that shape is a wide hearth. Furthermore, a wide hearth offers the proper volume of coke to the attack of the blast, and with a low vertical ignition the spreading of the heat is facilitated laterally more than vertically for the same quantity of air. This may mean a slightly lower temperature at the hottest region.

I hesitate to say exactly what is the proper hearth for the production of an iron of a given silicon content, because economy in coke consumption is regarded differently in different localities. Some metallurgists think that where coke is expensive, the hearth area in making foundry iron should bear approximately that relation to the hearth area in making Bessemer metal as the Bessemer time exposure does to the foundry iron time exposure. This is to be the relation if the furnaces producing foundry and Bessemer irons have the same stove and engine equipment, the same richness of ore and the same nature of the ore apart from phosphorus. This statement is crude, but it holds true in general. The natural field for experimenting on the dimensions of the blast furnace has been in those furnaces producing Bessemer irons, as they are usually assembled in larger units near together, and hence are more easily compared and studied.

"Inversely as the coke consumption" might be considered a better rule for varying the diameter of the hearth.

When the relation between hardness and calorific intensity, porosity and rapidity of ignition—softness and solubility in carbon dioxide—(disregarding the chemical per cents.) have been shown by our technical schools, we can speak other than by rule of thumb.

The principal argument in favor of the gas engine, as compared with the steam engine, is based on the far superior thermal efficiency of the former. There are other considerations, however, which may render the internal combustion motor applicable where the steam engine is out of the question. In localities where water is scarce there yet may be fuel sufficient for the production of power. In such places the wood or other fuel may be used to generate fuel gas to be consumed directly in the engine cylinder, thus dispensing entirely with the need for water, except for the small amount required for the cylinder jacket. In the Riche process the wood is placed in a closed retort and heat applied from without. The volatile constituents of the wood distil over in the form of gas, fully equal in calorific power to a high class illuminating gas, and well adapted for use in a gas engine for motive power, while in the retort the residue is an excellent charcoal.

In the lighthouse tower at Heligoland has recently been installed a new form of electric searchlight, consisting of three lower searchlights mounted 120 degrees apart, and a fourth one mounted above these and rotating three times as rapidly. The minimum intensity of the light is 30,000,000 candle power, the maximum current being 100 amperes. The lower platform revolves four times per minute and gives a duration of flash of one-tenth of a second. The power plant consists of two steam engines direct connected to generators of about 15 kw. each.

The Emerson Strainer and Foot Valve.

Avoidance of the difficulties arising in connection with fixed strainer foot valves when cleaning is necessary has been the aim in view in the design of the Emerson device here shown. With this appliance the strainer may be raised from its position at the bottom of the suction pipe, Fig. 1, hoisted clear of the liquid within which it is usually immersed, cleaned conveniently and lowered

Fig. 1.

Fig. 2.

again into place. No disconnection of piping is required in this operation, the strainer being free to slide upward upon the suction pipe, Fig. 2. Such comparative ease of cleaning would naturally lead to frequent performance of the operation, maintaining a full and clear inlet area for entrance of water to the suction pipe. The strainer is made of heavy perforated sheet metal, riveted to a substantial top casting sliding loosely upon the pipe, which acts as a guide when the strainer is raised and lowered. The aggregate area of strainer openings is, of

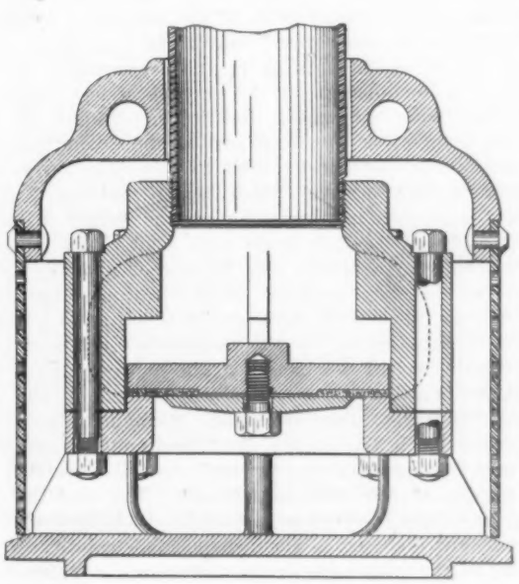


Fig. 3.

course, made liberally in excess of the internal sectional area of the pipe itself, assuring perfectly free flow of a full supply of water.

A special feature of the valve itself, as pointed out by the makers, is,that the movable disk is not guided or controlled by either spindle, spring or hinge, the absence of which customary details is believed to lessen, if not remove entirely, the liability of cramping due to the presence of some foreign object underneath the valve. The construction is clearly shown in Fig. 3, representing a section through the device. The gate is fitted within guides, the design being to avoid possibility of cramping, regardless of the position into which it falls. Areas of valve openings vary from 20 to 25 per cent. in excess of internal pipe areas for the several sizes.

Strainers alone, involving the feature of permitting raising for cleaning, but without the foot valve, are also made to meet the requirements of service wherein the valve is not needed.

Generous areas, direct passages, few obstructions, ample strength, great durability and good workmanship are enumerated among the makers' general claims for the complete appliance. For the strainer proper the large capacity and low velocity, due to great area of openings, are mentioned as desirable features. The low lift of the valve and its slight hight above the bottom of the apparatus are advantageous in enabling the almost complete drainage of any suction pit, chamber or reservoir. The easy cleaning feature should be effective in reducing liability to shutdowns and frequency of their occurrence. The makers are the Emerson Steam Pump Company, 1410 G street, N. W., Washington, D. C., whose factory is at Alexandria, Va.

Action of the Citizens' Industrial Association.

The Executive Committee of the recently organized Citizens' Industrial Association of America met in Dayton, Ohio, last week and passed resolutions against members of the association placing the union label on articles of their own manufacture. They also took ground in opposition to the eight-hour bill now pending in Congress. They further provided for the formation of a labor information bureau for the use of their members and issued an address to the public, from which the following extracts are taken:

In its demand for the closed shop, organized labor is seeking to overthrow individual liberty and property rights, the principal props of our Government. Its methods for securing this revolutionary and socialistic change in our institutions are also those of physical warfare.

Because of this warfare the industrial interests of the nation during the last year have been injured to an irreparable degree. Many firms have been driven into bankruptcy, and the cases are innumerable in which workingmen have been disabled and even murdered, while numerous families have been rendered destitute by reason of the tyranny and seditious atacks upon society by the strike organizations.

A condition of anarchy has existed continuously in some States for months past, and, in fact, the acts of lawlessness committed under the sacred name of labor are of such frequent occurrence that the public sense of their enormity has become blunted. The period of great prosperity brought about by the unrestricted operation of the law of supply and demand is also being destroyed by the acts of violence of organized labor, and, as a result, we are now confronted with the possibility of a period of depression.

While we most emphatically object to being classed as enemies of organizations of labor that are conducted upon lawful and beneficent lines yet we are unalterably opposed to the present programme of violence, boycotting and tyranny now being carried out by the majority of labor unions.

We therefore urge the rapid organization of those who believe in the maintenance of law and order, and the perpetuation of our free institutions, to the end that they may wield their full and proper influence upon the destinies of the nation.

The Sault Canals' Tonnage.—The tonnage passing the St. Mary's Canals, at the outlet of Lake Superior, for November was 2,807,454 tons, making 34,177,239 tons for the year. The December tonnage will be very light, as the last boats left Duluth December 5, and the total business of the year will be under 35,000,000 tons. Last year's total was 35,961,146, and that of 1901 was 28,403,065 tons. Items of chief tonnage for the month and year are as follows:

	November.	Year to date.
Copper, tons	13,984	105,642
Grain, bushels	23,879,820	88,560,103
Iron, gross tons	912,764	19,250,764
Flour, tons	124,339	749,595
Timber, thousand feet	128,903	986,228
Coal, tons	612,752	6,944,218

The canals will close for the year about December 10.

Prospective Tariff Changes.

Modifications in the Philippine and Cuban Schedules.

WASHINGTON, D. C., December 8, 1903.—While the tariff question, so far as it relates to modifications in the rates of duty as provided by the Dingley act, has been placed under the ban by the majority leaders of both houses of Congress, there are, nevertheless, a number of minor movements on foot having for their objects certain changes that are of special interest to manufacturers, exporters and importers.

Cuban Reciprocity Reductions.

The agreement reached in the Senate providing for a vote upon the bill to make the Cuban treaty effective will result in the passage of that measure on the 16th inst. Under the terms of the bill the treaty will take effect ten days after the exchange of ratifications, and assuming that four or five days will be required for the ceremony, the reduced rates will go into force about January 1, 1904. The reduction upon iron and steel, machinery and metal goods in general imported into Cuba from the United States will be 25 per cent. ad valorem, with the exception of cutlery, the duty on which will be reduced 30 per cent. Under the customs administrative laws of both the United States and Cuba goods in bonded customs warehouse, upon which the duties have not been paid, will be entitled to be withdrawn at the reduced rates after the treaty becomes effective.

In this connection the interesting information has reached Washington through unofficial channels to the effect that the Cuban Government is about to undertake a revision of the existing tariff, with a view to increasing the revenue in order to provide for a sinking fund with which to redeem the proposed bond issue of $35,000,000. The receipts under the present tariff are reported to be entirely adequate to meet current expenditures, but the various plans proposed for the creation of a sinking fund for the bond issue referred to do not promise well, and the Government naturally turns to the tariff as a possible source of increased revenue. The project now under consideration involves increases in the rates on certain schedules about equal to the reductions that have been made by the reciprocity treaty with the United States, and should this plan be carried out American merchandise would continue to pay the old rates while goods from foreign countries would pay correspondingly higher duties. As to the practical effect of such modifications, the Cuban officials insist that the tariff as provided by the reciprocity treaty would be below the revenue point; in other words, that it can be increased materially without reducing the importations. It is also contended that good faith with the United States will be maintained no matter how much the duties may be increased, provided the relative discrimination against other countries is observed. It should be said, however, that there is a strong element in the Cuban Government opposed to making any increase in the tariff until the revenue producing power of the recently levied internal stamp taxes has been fully tested.

Rates on Philippine Products.

Very early in the special session Senator Lodge of Massachusetts introduced a bill providing for the free entry into the United States of all Philippine products except sugar and tobacco, which are to be dutiable at 50 per cent. of the rates of the Dingley law, and stipulating that "for a period of five years the Government of the Philippine Islands are hereby authorized in their discretion to remit all duties upon material imported into the Philippine Islands for the construction or equipment of steam or electric railroads or street railways." This measure, with the exception of the stipulation quoted, was passed by the House in the last Congress, but failed to be acted upon in the Senate. As a revenue measure it must necessarily originate in the House, but Senator Lodge presented it early in the session, hoping that it would be favorably reported from the Committee on the Philippines without delay, so that when passed by the House it could at once receive the vote of the Senate. Domestic sugar and tobacco interests, however, have filed strong protests against the bill, and have been influential enough to prevent its consideration by the Senate committee during the special session. The House leaders also have been impressed with the embarrassment that might result should an attempt be made to pass a bill reducing the duties on Philippine products, as such a measure would be open to amendments and would precipitate the tariff discussion, which was averted in the case of the Cuban treaty only by the adoption of drastic methods which the leaders would hesitate to invoke in the case of the Philippine bill. The President has, therefore, been informed that it is not deemed advisable to pass this bill at the present session, but in view of the urgent representations by Governor Taft and Secretary Root the Senate leaders are not disposed to give up the fight. Senator Foraker, especially, insists that the bill shall be reported by the Ways and Means Committee, and urges the House leaders to consider it even at the cost of a protracted tariff debate, which he asserts would benefit rather than injure the dominant party in Congress.

Late cable advices received here state that Governor Taft has decided that the tariff of the Philippine Islands which took effect in September, 1901, is now in need of revision to correct certain inequalities and incongruities that have been developed. He has therefore appointed a mixed commission composed of Government officials and commercial experts, who are to give hearings as the basis for recommendations for changes. While the proposed revision will not be made with reference to an increase or decrease in the total revenues of the islands, the commission will endeavor to reduce duties on food supplies, clothing, building materials, &c., and in the event that Congress fails to pass the Lodge bill the insular Government may adopt the provision above quoted granting free entry to railroad material of all kinds. The work of revising the tariff will probably take several months, and the final draft will be submitted to the Secretary of War and published with a view to securing the opinions of American exporters before action is taken by the Philippine Commission putting the amendments into force.

No Reciprocity with Canada.

Since the beginning of the special session of Congress there has been much agitation of the subject of reciprocity with Canada, and several resolutions have been introduced in the House looking to the reconvening of the Joint High Commission for the purpose of negotiating a reciprocal trade agreement, but in the opinion of the leading members of the Ways and Means Committee, little progress is likely to be made in this direction at the present regular session, which began yesterday. The State Department has for some months sought to bring the commission together again with a view to settling a number of controversies, and Senator Fairbanks some time ago addressed a formal communication to the British Premier, Sir Wilfrid Laurier, inquiring as to when it would be practicable for the commission to reconvene. Sir Wilfrid replied that action in the matter would have to be postponed until after the adjournment of the Canadian Parliament, then in session. Parliament has since adjourned, but in the interval the Canadian press and public have become greatly exercised over the decision in the matter of the Alaskan boundary line, and intimations have been received here that the Canadian officials are not now disposed to assume the responsibility of referring to arbitration any further questions in which Canada is intimately interested, and it is probable that until considerable time has elapsed it will not be practicable to reconvene the Joint High Commission. It is a somewhat significant fact in this connection that Speaker Cannon of the House of Representatives is personally opposed to the negotiation of a reciprocity treaty with Canada at the present time, and in the closing hours of the last Congress succeeded in causing to be eliminated from the sundry civil bill a special appropriation of $25,000, asked for by the Secretary of State and put in by the Senate, to defray the expenses of another session of the Joint High Commission.

Tariff Bills for Congress.

Several tariff bills of more or less importance have been introduced since the convening of the special session, and are now on the calendar of the Ways and Means Committee. One of the most interesting of these measures has been introduced by Representative Griffith of Indiana, and provides for placing on the free list all iron in slabs, blooms, or other forms less finished than iron in bars and more advanced than pig iron; beams, girders, joists, angles, channels and other structural shapes; boiler or other plates of iron or steel except crucible steel and sam plates; railway bars of iron or steel, T-rails, &c.: steel ingots, blooms, slabs, billets, bars, &c., except crucible steel. The measure also provides for a 50 per cent. reduction in the duties on the remaining paragraphs of the metal schedule. Mr. Griffith also embraces in his bill reductions on building materials of all kinds, including wood and manufactures thereof, cement, lime and plaster, glass, paints, colors, varnishes, &c.

It is the general understanding that none of these tariff bills will be seriously considered by the Ways and Means Committee at the present session. They are not wholly without significance, however, as representing the views of certain members of the House who are sufficiently interested in the tariff question to draft these measures and also because the Ways and Means Committee will find them upon the latest docket if the present plan of revising the tariff after the next Presidential campaign is carried out. W. L. C.

Lined Tubing vs. Solid Metal.

The *Metal Industry* says: The use of brass in furniture trimmings and similar goods is a matter which usually does not require the highest grade of material. Finish is generally paramount to everything else. Our attention was recently called to the extending use of lined tubing in this and similar trades, and we were more or less surprised to find the quality of the tubing as good as it is and admirably adapted to the uses to which it is put.

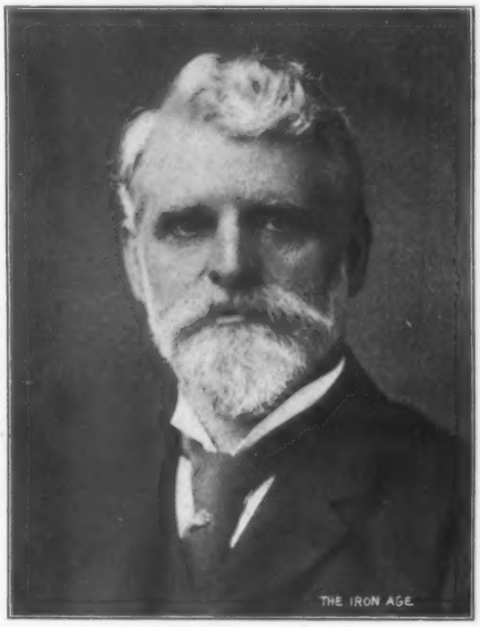
The advent of the brass bedstead in the United States is apparently responsible for the production of lined tubing, for here was a case where nothing was required except finish and the requisite strength. The early bedstead manufacturers made tubing themselves by forming brass sheet over iron pipe. This gave the requisite strength. The call for better material, however, became loud, and the maker soon found that to produce a good material it is necessary to use a lining metal which has a smooth, cylindrical surface. Seamless drawn steel tubing is now used, and over it the brass is drawn so that, to all appearances, a solid brass tube is produced. We have recently seen such tubing stand all the difficult bending that could be given a seamless copper tube, and for many purposes, such as bedsteads and show work of various kinds, it possesses every advantage of the seamless or brazed product. This tubing should supplant the electro plated iron rod upon which a thin coating of brass has been put, as such material sooner or later rusts and becomes unsightly. Several of the brass manufacturers have begun the manufacture of a good lined tubing, and we believe that many new uses will be found for the product.

United States Cast Iron Pipe & Foundry Company.—George B. Hayes, president of the United States Cast Iron Pipe & Foundry Company, has issued the following: The litigation in which the company have recently been engaged with Andrew H. McNeal, one of their former officers and resident managers, has been terminated by the company's paying Mr. McNeal $20,000 for a perpetual license to use all of his patents relating to the pipe making and foundry business in all of their plants, and for a release of the claims made against them by him in several other suits. Mr. McNeal was offered this sum for the use of his patents alone prior to the institution of these suits, but then refused to accept it. The suit instituted in June last by Mr. McNeal for the appointment of a receiver for the company was brought to aid him in the prosecution of the suits which have been settled, and has been voluntarily withdrawn by Mr. McNeal.

The Newly Elected President of the Mechanical Engineers.

As stated last week, the election of officers of the American Society of Mechanical Engineers for the year 1904 resulted in the selection of Ambrose Swasey of Cleveland, Ohio, as president. Mr. Swasey is well known as vice-president and treasurer of the firm of the Warner & Swasey Company, Cleveland, makers of optical and astronomical instruments and various instruments of a similar nature, as well as of fine machine tools, &c. This firm is thus honored for the second time, Mr. Warner having filled the president's chair of the society during the year 1897.

Mr. Swasey was born at Exeter, N. H., on December 19, 1846. He was educated at Exeter Academy, when at the age of 18 years he entered apprenticeship to acquire the machinist's trade. Six years later, in 1870, he entered the employ of the Pratt & Whitney Company, at Hartford, Conn., where he remained for ten years, rising rapidly through positions of increased responsibility and finally having charge of the gear department. During his connection with this firm he rendered valuable service in the development of gear cutting machinery, many features of which are to-day recognized as standard in this class of tools. In 1880 Mr. Swasey, in company with W. R. Warner, with whom he had been associated for a number of years at the works of the Pratt & Whitney Company, formed a copartnership, which has since become the Warner & Swasey Company. This firm, through Mr. Warner's astronomical inclinations and Mr. Swasey's mechanical experience and capability, have occupied for a long time a very unique position in the commercial world, their products in the line of scientific instruments ranking with those of any maker in the world. Of popular, as well as scientific interest, is the fact that the Warner & Swasey Company made the tubes and mountings for the 26-inch telescope at the United States Naval Observatory at Washington, the 36-inch telescope at Lick Observatory, California, and the great 40-inch Yerkes telescope at Lake Geneva, Wis.



AMBROSE SWASEY.

The sheet rolling mill of the Tamarack-Osceola Mfg. Company at Dollar Bay, Mich., has been sold to the Association of Brass Manufacturers. The plant will be entirely dismantled and the machinery shipped East. The wire mill will continue in operation as usual.

The Perkins Power Tile Press.

The use of tiles for various purposes in structural work has now become so extensive that the older types of hand presses, heretofore most commonly used in forming the tiles, do not offer the desired efficiency, as regards either rate of output or costs of production. To improve upon this rather more primitive condition of affairs the machine of which we show front and rear views has been designed. With one of these new power presses, operated at the works of a prominent tile manufacturer, 5000 perfect tiles per working day have been produced, while the output by the hand press method is stated as being from 500 to 600 for an equivalent time. It is claimed that even this eight or ten fold increase of output does not represent the limit of the possibilities with this machine.

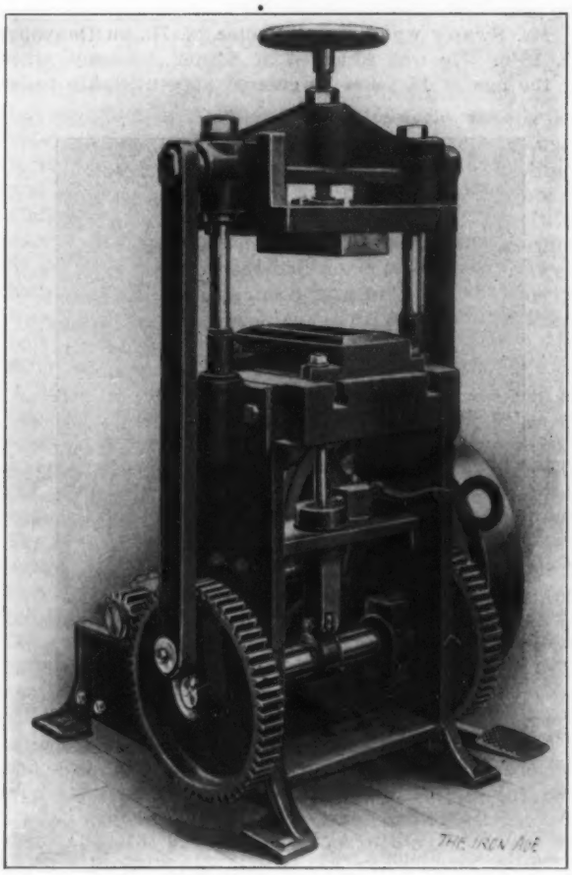


Fig. 1.—Front View.

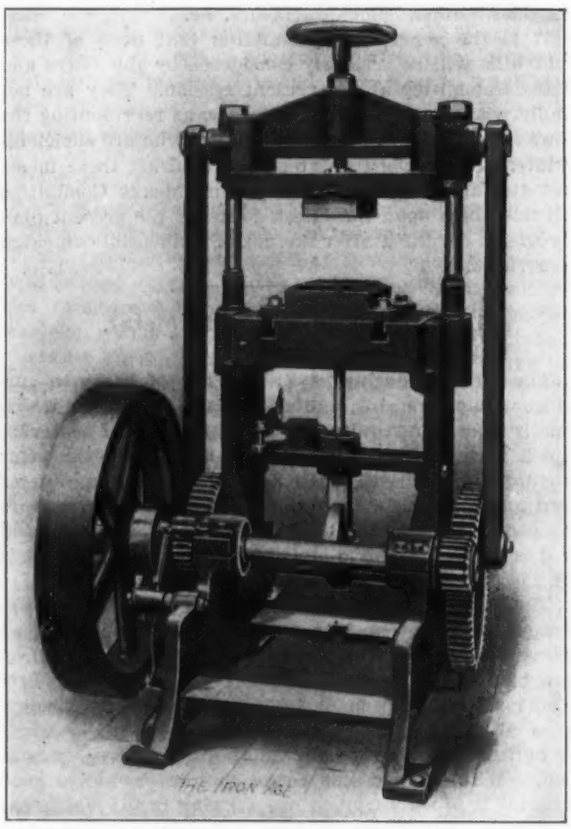


Fig. 2.—Rear View.

THE PERKINS POWER TILE PRESS.

The operation of pressing out a tile is accomplished by the downward movement of the die, actuated by connecting rods from crank pins set in the faces of the large gears seen at either side. These gears are driven by pinions—ratio 4 to 1—upon the driving shaft, carrying the fly wheel and belt pulleys. The die head is guided by the side rods, which slide within the bearings provided at either side of the mold. The die is adjustable vertically to provide for different thicknesses of tiles. The adjustment is made by means of the hand wheel at the top of the machine, the die plate being fitted to slide upon vertical guides on the die head. The mold is bolted to the bed of the machine, T-slots being provided for use in this way. Any desired form of mold may thus be used and a wide range of tile shapes produced. In the bottom of the mold is a lifting plate attached by a round bar to a square plunger working within a suitable guide below the bed or table. At the lower end of the plunger is fitted a roller which rests upon a cam of such form and so placed upon the gear shaft as to rotate idly while the die is descending and pressing the clay into the mold, but rising to force the pressed tile out of the mold as the die is withdrawn. This lifting plate rises to a position flush with the top of the mold, so that the tile is easily removed. Adjustment of the hight of the lifting plate is provided for, so that various hights of molds may be accommodated. The lifting plate falls quickly to the bottom of the mold when the highest point of the cam passes from under the plunger roller and allows the latter to drop directly to its lowest position. When it is desirable to hold the lifting plate at its highest point, the knee of the operator, pressing sidewise upon the ring ended lever at the right of Fig. 1, may force the taper pointed latch into a correspondingly formed depression in the side of the plunger. Release of the pressure upon the lever allows the latch to be withdrawn by the spring coiled around it. Should the operator not release the lever in time, the latch would be automatically forced back as the die descends on the next stroke, since the taper point cannot offer great resistance to the descent of the plunger when held only by the knee pressure of the operator.

The complete machine weighs about 2000 pounds. It is made by the Perkins Machine Company, South Boston, Mass.

The Townsend-Downey Shipyard to Be Operated.—Judge Holt of the United States District Court, New York, has granted authority to Henry E. Ide, receiver in bankruptcy of the assets of the Townsend-Downey Shipbuilding Company, to complete the construction and repair of the vessels now in the yards, to undertake such other work as can be profitably performed, and to pay the arrears of wages of employees and arrears of insurance. The receiver is empowered to borrow up to $100,000 for the above purposes, by issuing receiver's certificates, to bear 6 per cent. interest and to be sold for not less than par. They are to be a first lien and payable out of any

trust funds that come into the hands of the receiver. The receiver also can carry on the business for 30 days, with the privilege of applying to the Court for a further extension of time.

Power and Machinery at the St. Louis World's Fair.

In spite of strikes and unjust exactions of labor, and in the face of difficulties in securing raw and finished materials promptly, such great progress has been made in every branch of the construction of the "Universal Exposition," as they call it now, at St. Louis, that there is every likelihood that the buildings will be complete before the date of opening, which is April 30, 1904. Since the publication of our article in *The Iron Age* of April 23 buildings that were then only frame works are now completed—staff counterfeits of marble and masonry. Other buildings that were not then even staked out are now under roof, and an army of labor, skilled and unskilled, is rapidly bringing order out of chaos under the experienced supervision of the chiefs of the departments interested.

Much depends on the character of the weather between now and April and upon the attitude of labor. Unless both of these forces are exceptionally antagonistic the buildings will be ready for exhibits by March, or before. Some buildings are practically ready now, with the exception of finishing touches to the interior.

The attitude of the management of the fair in charging nothing for the privilege of exhibiting worthy goods and of relieving the exhibitor of the expense, petty extortions and trouble connected with unloading the exhibits at the grounds, transferring to buildings and erecting *in situ*, will do much to facilitate the installation of exhibits, so that the fair will be as nearly as possible completed on the opening day.

To such of our readers as visited the World's Fair at Chicago in 1893 the size of the St. Louis Fair may be indicated by the statement that it covers nearly double the area of the Chicago exposition, and that the buildings are even on a grander scale than those of the White City. A plan view of the grounds is shown in the accompanying illustration, Fig. 1.

Under the supervision of Thomas M. Moore, chief of machinery and power equipment, the engineering features of the St. Louis Exposition will surpass those of any previous fair here or in Europe.

Machinery Hall.

The Machinery Building, with its annex, covers 12 acres of ground and is already completed externally. Foundations for the huge engines and other machinery are now being completed. A 40-ton electric traveling crane is installed and is already busily gliding backward and forth hoisting huge foundation castings of engines into place, and a 60-ton crane is in course of erection. The eastern half of this building will be devoted to exhibits of machinery and tools, most of which will be in operation performing their allotted tasks. In general the southern half of the east section will be devoted to wood working machinery, and the northern half to metal working machinery. Power for all operating machinery will be furnished by motors attached direct to the machines. These motors receive their impetus from generators attached to engines in the power plant proper in the western half of the building. There will be no line shafts in the entire building, nor anywhere on the grounds.

The western half of Machinery Hall will contain the largest and most noteworthy exhibition of engines and generators ever brought together in one place in the world's history. The larger engines are grouped in a row in the center with a line of smaller steam engines, generators and transformers along the northern wall, and gas, oil engines and water motors along the southern wall. The ground plan of this section is shown in Fig. 2. The central bay is divided into four sections, the first of which, approaching from the east, will contain the Allis-Chalmers 5000 horse-power Manhattan type engine, with its accompanying 3500-kw. Bullock generator. The next section comprises the power plant of the Intramural railway, which is more fully described later in this article. The third section contains the two greatest exhibits in engineering on the grounds—namely, the 3000 horse-power Cockerill gas engine and the 8000 horse-power General Electric steam turbine. The fourth section comprises four 3000 horse-power Westinghouse engines, with two Westinghouse 2000-kw. generators and two of the same capacity made by the General Electric Company.

In the bay south of the Westinghouse engines will be shown among others the following: A 2250 horse-power vertical Hamilton Corliss engine, with 1500-kw. generator from the National Electric Company; a 1000-kw. steam turbine with 1000-kw. Bullock generator; a 1000 horse-power Willans engine exhibited by the Bradley Mfg. Company with 750-kw. Stanley generators; a 1000 horse-power Mülhausen engine with 700 kw. generator; a 1500 horse-power Belleville-Delaundy engine with 1100-kw. generator.

Gas Engines.

One of the most noteworthy exhibits in the whole exposition is the 3000 horse-power gas engine built by Société Anonyme John Cockerill, Seraing, Belgium. This engine is of the double acting tandem type, occupying a space 62 feet long by 43 feet wide, and with its 2000-kw. General Electric generator it weighs over 400 tons. The exposition authorities claim that the Cockerill engine has five times the power of any gas engine ever exhibited in any exposition, three times the power of any gas engine on the Western Hemisphere, twice the power of any gas engine operating in Europe and 50 per cent. greater than any other gas engine ever designed and now in process of construction. It will exemplify the highest type and the greatest might yet seen or likely for many years to be seen in the development of the gas engine. Gas for this engine is produced in the Steam, Gas and Fuels Building several hundred feet away by a producer gas plant made and installed by W. F. Mason & Co. of Manchester, England. The 2000-kw. direct connected alternator serving the Cockerill engine is supplied by the General Electric Company and works parallel with three alternators of the same rating installed by the same company. Another noteworthy gas engine, the Borsig, will be described in connection with the Intramural plant, of which it forms a part.

The fly wheel of the Cockerill engine weighs 34 tons, has a diameter of 28 feet and its rim travels at the rate of nearly 1¾ miles per minute. A medium size horse can be driven through its cylinders, and its two pistons each travel 10 feet at every complete stroke and each makes 100 strokes per minute. About 30 tons of coal per day will be consumed in the generation of the gas to operate it.

Mammoth Steam Turbine.

The greatest steam turbine ever put on exhibition will adjoin the Cockerill gas engine. It will have a rating of 8000 horse-power, and is being built by the General Electric Company of Schenectady, N. Y. It is built on the same plans and specifications as the ten turbines being constructed by the same works for the Commonwealth Electric Company of Chicago. It will present in sightly form the greatest aggregate of power thus far concentrated into so small a space. While its rating is nominally 8000 horse-power, it guarantees to deliver 12,000 horse-power with safety. Its manufacturers prophesy that this type of engine, because of its comparatively small first cost, its great economy of space and head room, and its claim of economy of operation, will supersede the now prevailing types of engines.

Intramural Power Plant.

Winding in and out among buildings, climbing hills and dodging along wooded slopes, the cars of the Intramural railway of the grounds will carry hundreds of thousands of people. The circuit of the grounds on this line is approximately 10 miles. This feature of the fair, owned and operated by the exposition company, will prove to be one of the most popular on the grounds. The power plant for this electric railway occupies a space approximately 100 feet square in the Machinery Building. It comprises the following engines: A 1750 horse-power gas engine, built by the A. Borsig Company,

whose plant is near Berlin, Germany, directly coupled to a 900-kw. 500-volt generator; a 900 horse-power engine, built by the Lane & Bodley Mfg. Company, Cincinnati, Ohio, with 600-kw. generator; a 750 horse-power slow speed engine from the Murray Iron Works Company, Burlington, Iowa, with 500-kw. generator; a 600 horse-power engine from the Harrisburg Machine & Foundry Comapny, Harrisburg, Pa., with a 400-kw. generator, and a 500 horse-power Abner Doble tangential water wheel, built by the Abner Doble Company, San Francisco, Cal. All the electric generators in this intramural plant are of the Crocker-Wheeler type.

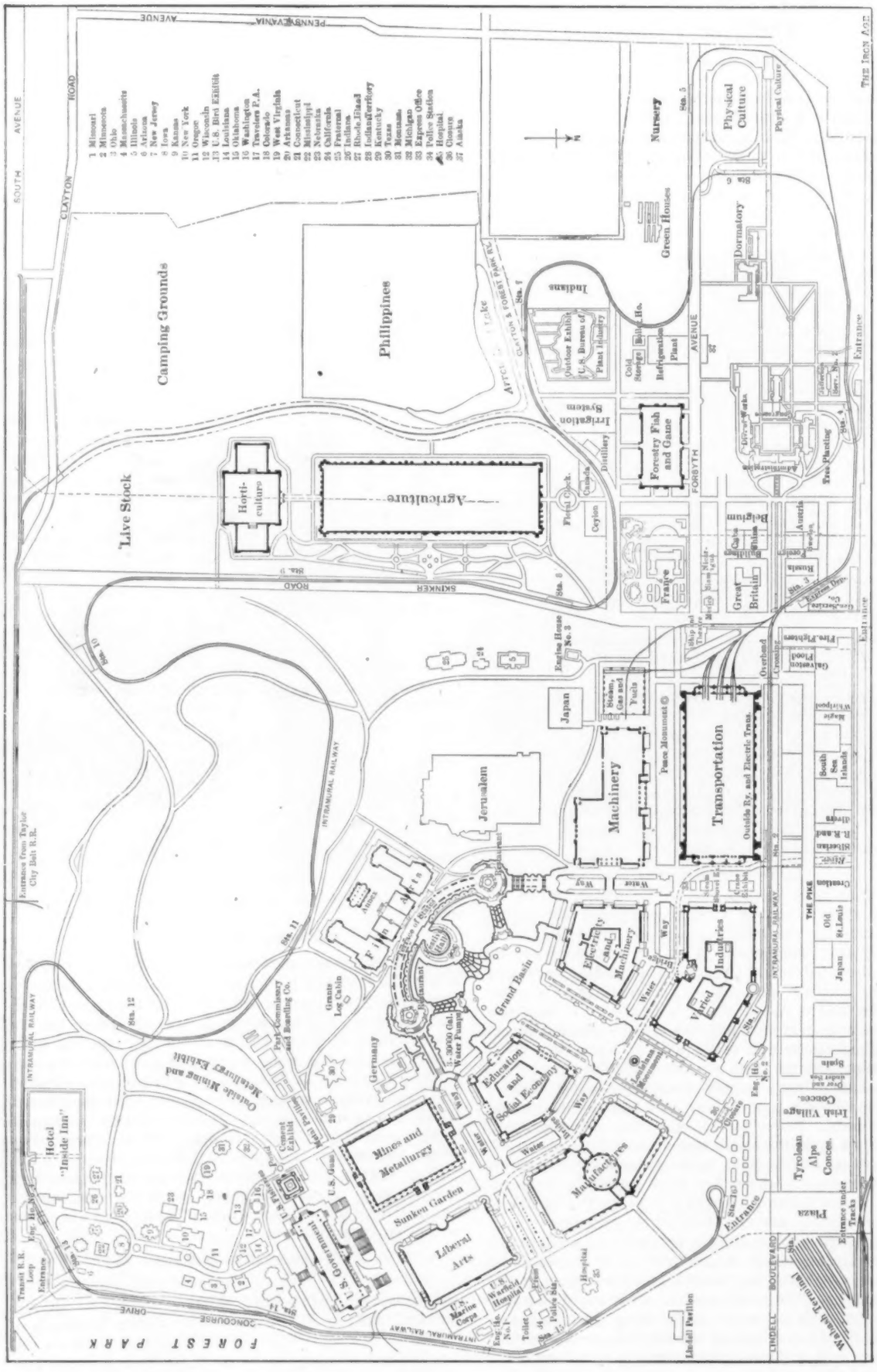


Fig. 1.—Plan View of the Grounds.

POWER AND MACHINERY AT THE ST. LOUIS WORLD'S FAIR.

The water wheel is worthy of special mention. It will be operated by water forced through pipes at the rate of 12,000 gallons per minute, with a pressure of 300 pounds per square inch at the nozzle. This volume of water

strikes the buckets of the wheel, transmits its energy and falls as quietly as if poured from an ordinary basin. The wheel itself will make 900 revolutions per minute, and its power will be converted into electricity and put to practical use in the exposition.

Allis-Chalmers Engine.

What the Corliss engine was to the Centennial Exposition of '76, the Allis-Chalmers Manhattan type engine will be to the St. Louis Exposition. While the steam turbine above mentioned exceeds it in power, the Allis-Chalmers engine is the largest piston prime mover on the grounds. Its rating is 5000 horse-power, and it is known as the Manhattan type because it is built on the lines of the engine furnished by the same builders for the Manhattan Railway system of New York. It occupies a floor space 35 x 45 feet and is 54 feet high, of which 34 feet will be above the floor. Its weight, with the Bullock Electric Mfg. Company's generator, which is coupled to it, is over 600 tons. The foundations for this engine are now about completed, having cost $6000. The engine and generator cost $150,000. The generator is directly connected to the engine and mounted on its main shaft, which will have 85 revolutions per minute. A 300 horse-power Ide engine with a 200-kw. Bullock generator will occupy the same bay as the Allis-Chalmers engine.

Westinghouse Engines.

The westernmost bay of Machinery Hall will be occupied by four 3000-kw. Westinghouse engines set in a row at 40-foot centers. Each of these engines has a directly connected 2000-kw. generator, two of which are furnished by the Westinghouse Company and two by the General Electric Company.

The Steam Main.

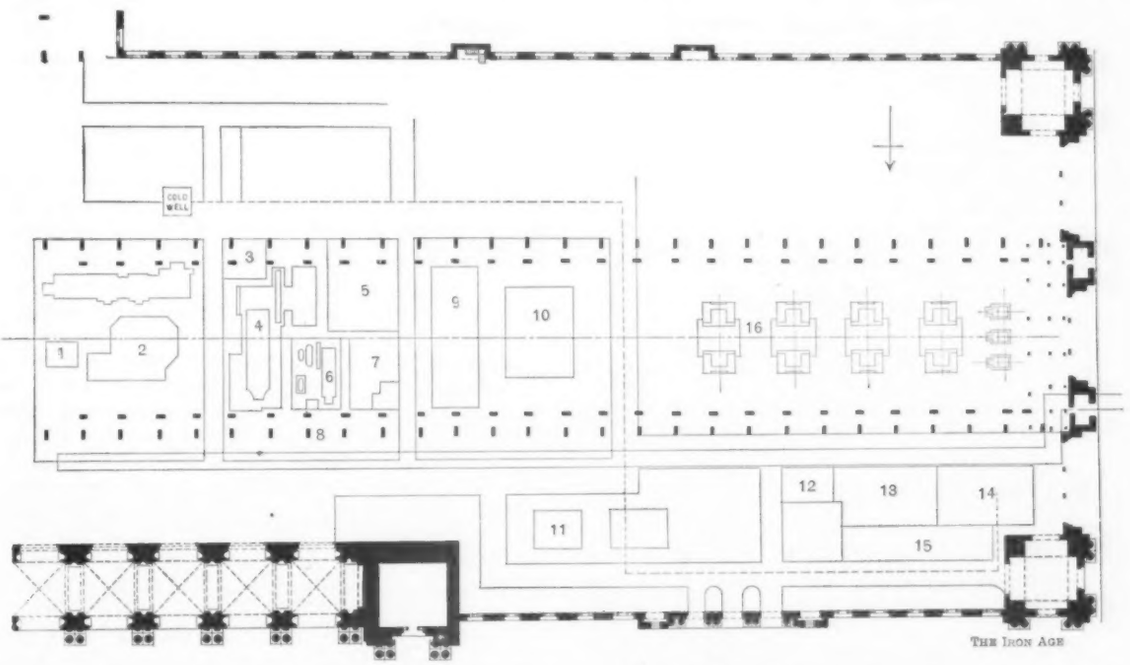
Altogether over 45,000 horse-power is represented in the engines which will be in operation in the western end of Machinery Hall, of which 1200 horse-power will be required for electric lighting, 6000 horse-power for the Cascade pumping station and the balance for exhibits and general purposes. Steam for the engines and turbines comes to Machinery Hall through a huge underground steam pipe, at the other end of which are the boilers in the Steam, Gas and Fuels Building, which adjoins Machinery Hall to the west.

Steam, Gas and Fuels Building.

What was originally intended as simply a boiler house, with utility rather than public attraction as its motive, has been metamorphosed into an exhibition building of profound interest through the efforts of Thomas M. Moore, chief of this division. The Steam, Gas and Fuels Building is almost in the geographical center of the grounds and will doubtless prove to be the center of its moving population. It is built of steel and cement, being 300 x 326 feet in dimensions and about 100 feet high. In it wil be grouped, in such a way as to give the observer the opportunity of making comparisons, all the best known types of boilers, both European and American, including water tube boilers, marine and stationary, Scotch boilers and ordinary stationary tubular boilers, the pressures ranging from 125 to 300 pounds per square inch. These will be augmented by gas producing plants for the gas engines in Machinery Hall, coal briquetting plants, water purifying and softening systems for the water supply, mechanical draft plants for supplying the boilers with their oxygen, and a most complete

Coal Handling System.

Coal will be brought to the building on track laid for that purpose in 50-ton steel, self cleaning hopper cars, controlled by the exposition company. From these cars it will be conveyed by about 2200 feet of conveyors to overhead coal bunkers, which have a capacity of 4000 tons, or to coal crushing machinery, and distributed in the same manner from these centers to the automatic



1. Ide 300 horse-power engine, with Bullock 200-kw. generator.
2. Allis-Chalmers 5000 horse-power engine, with Bullock 3500-kw. generator.
3. Abner Doble 500 horse-power tangential water wheel.
4. Borsig 1750 horse-power gas engine, with 900-kw. generator.
5. Murray 750 horse-power engine, with 500-kw. generator.
6. Lane & Bodley 900 horse-power engine, with 600-kw. generator.
7. Harrisburg 600 horse-power engine, with 400-kw. generator.
8. Intramural power plant, Crocker-Wheeler generators.
9. Cockerill 3000 horse-power gas engine, with 2000-kw. General Electric generator.
10. General Electric 8000 horse-power steam turbine, with 2000-kw. generator.
11. Hamilton-Corliss 2250 horse-power vertical engine, with 1500-kw. National Electric generator, and 1000 horse-power steam turbine, with 1000-kw. Bullock generator.
12. Bradley Mfg. Company Willans 1000 horse-power engine, with 750-kw. Stanley generator.
13. Mulhausen 1000 horse-power engine, with 700-kw. generator.
14. Belleville-Delaunay 1500 horse-power engine, with 1100-kw. generator.
15. Transformers.
16. Four Westinghouse 3000 horse-power engines, with two Westinghouse 2000-kw. generators and two General Electric 2000-kw. generators.

Fig. 2.—Ground Plan of Engine Section of Machinery Hall.

stokers or feeding devices of the various boilers, as well as to the gas producer and briquetting plants. Anthracite coal, bituminous coal, briquetted coal, powdered coal

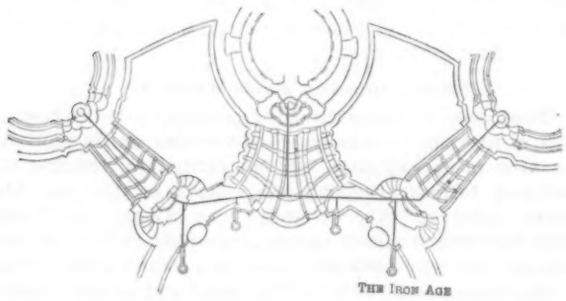


Fig. 3.—Plan of Cascade and Piping.

and fuel oil all find storage and use in this interesting building.

Practical Demonstration of Smoke Consuming Devices.

It is estimated that 400 tons of coal will be consumed daily in this building. Both from necessity and from choice as well the boiler installations will be equipped with a view to producing a minimum amount of smoke. Induced draft furnished by means of huge fans of the Sturtevant and other makes will do away with the necessity of tall chimneys. All the leading makes of mechanical stokers will be shown in actual operation. The grinding and firing of pulverized coal will be given practical demonstration. Oil as a fuel will also be used in at least one battery of boilers. Merits of various grades of coal will be tested. The exposition company have arranged to give any one exhibitor or group of exhibitors who install as much as 1500 horse-power a separate stack, so that definite tests of density of smoke at the mouth of the stack may be made.

Gas Producers.

The southwestern quarter of the building will be devoted to gas producers, the largest unit being the 3000 horse-power Duff-Whitfield system installed by W. F. Mason & Co. of Manchester, England. Adjoining this will be a 2000 horse-power system installed by R. D. Wood & Co. of Philadelphia. Both these systems will pipe their gas into tanks or holders. A noteworthy gas producer is that of Julius Pintsch of Berlin, 2400 horse-power capacity, direct suction, doing away with receivers. The Société Anonyme John Cockerill, Seraing, Belgium, will exhibit a gas scrubber.

Briquetting Machines.

The northwestern corner of the building will be devoted to briquetting machines of various types, the briquettes passing direct from the machines by means of conveyors to hoppers in front of such boilers as will use them.

Exactness of Engineering Science Illustrated.

The standardization of engineering practice the world over has reached such a degree of perfection that the exposition company will group together into an individual working system units from all over the world; as, for instance, a single installation takes one element from San Francisco, one from Jeanesville, Pa.; one from Ampere, N. J.; one from Providence, R. I., and still another from Boston, Mass. These five elements will be assembled in one working unit and will without doubt fit each other as accurately as if they had all been built in one shop. Another example is the Intramural power plant, described earlier in this article, whose units, involving steam, gas, water and electricity, come from all portions of the world, but all of which will work in harmony in producing the power necessary to run the lines of cars throughout the grounds.

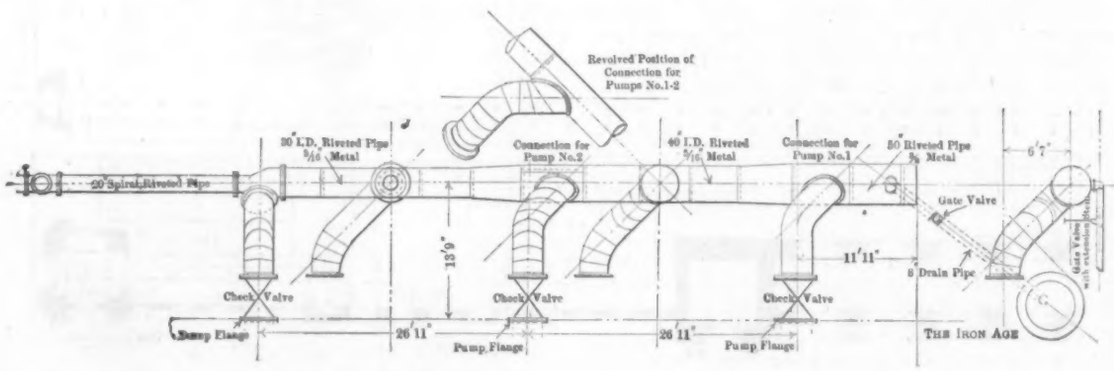


Fig. 4.—Discharge Header of Cascade.

Cascades and Fountains.

The scenic masterpiece of the exposition grounds is the Cascade, the largest plant of the kind ever contrived.

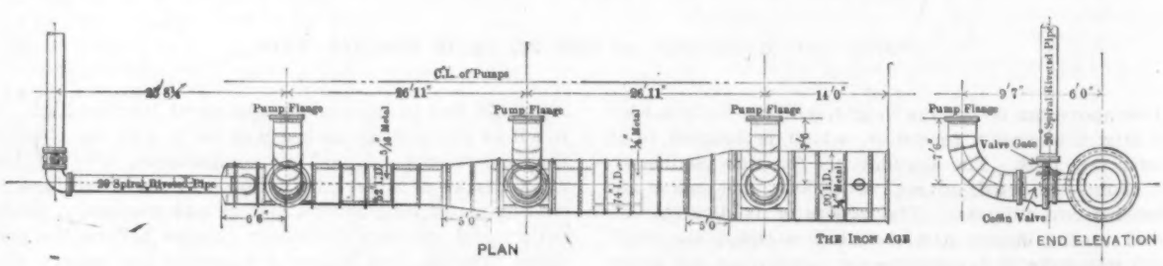


Fig. 5.—Suction Header of Cascade.

POWER AND MACHINERY AT THE ST. LOUIS WORLD'S FAIR.

This feature of the fair is under the direct supervision of Isaac S. Taylor, director of works, but H. F. Smith, assistant mechanical engineer, has had active charge of its design and execution. This Cascade will pour a volume of 90,000 gallons of water per minute down a terraced incline in three channels converging into a grand basin, the plan being shown in Fig. 3. This requires a larger pumping plant than that of the city of St. Louis itself. The

pumping plant of the Cascade is situated underneath the easternmost or left hand spillway. It consists of three centrifugal pumps furnished by Henry R. Worthington Company, each of which delivers 30,000 gallons of water per minute against a double head of 159 feet. These are said to be the largest individual pumps ever built. They are 36-inch single stage and each driven by 2000 horsepower alternating current motor. The pumps are guaranteed to withstand an overload of at least 25 per cent. The water before being pumped will be subjected to filtering and purifying processes and will be used over and over again with only a sufficient further inflow through the purifiers to keep up the volume. A unique feature of this Cascade is that it is to be made useful as well as ornamental. It is to serve as a cooling tower for the power plants in the Machinery Building and its annex, 3000 feet away. The exhaust steam from the engines is condensed into water and pumped through a line of piping to the Cascade pumping plant. After dashing down the magnificent Cascade and passing a mile or two around the grand canal this water is pumped from a low point in the canal near Machinery Hall westwardly to the boilers in the power plant. The piping for the Cascade is both spiral riveted and the ordinary boiler shop construction. The two largest elements are, of course, the discharge header and the suction header, the former of which, Fig. 4, is about 80 feet long, tapering from 50 inches diameter to 20 inches diameter, with five main outlets flanged and riveted in place. The suction header, Fig. 5, is 90 inches diameter at the larger end and 52 inches at its smaller, with three flanged inlets. These headers are made of tank steel, varying from ⅜ for 50-inch and larger to 3-16 for 16-inch diameters. It is not within the scope of this article to dilate upon the artistic effect that will be produced by this fountain, but it is only just to say that the natural advantage of its location, which is on a wooded hillside just below the plaza of the Art Building, the mighty volume of water that will be shot high into the air by the main fountains, the tumble and dash down the rugged Cascade with a final fall into the grand basin, will make a picture at once grand and beautiful. When to these are added the electric fountains and the play of many colored lights at night the Cascade will be one of the talked of and remembered features of this fair.

Methods for Testing Locomotives.

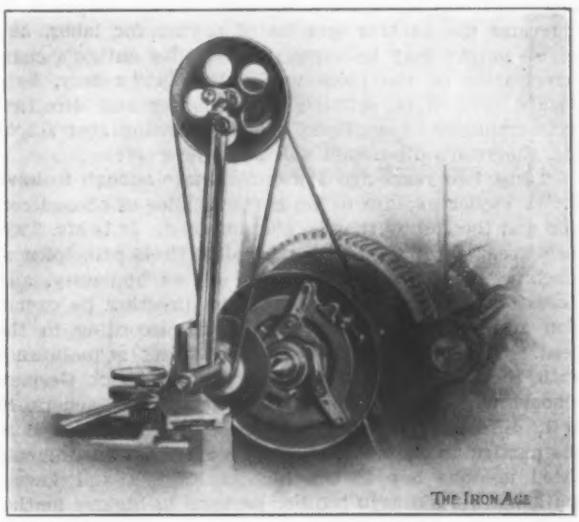
It will be left to future articles to describe the wonders of the Electrical Building, the Mines and Mining Building and the Transportation Building, but a new feature of the Transportation Building is of such international importance that we cannot delay its mention until future articles. We refer to the plant for testing locomotives that is to be installed by the Pennsylvania Railroad Company. Willard A. Smith, chief of transportation, is to be credited with this important feature of the St. Louis Exposition, as it is through his effort that after years of endeavor a road has been found willing to make the great expenditure necessary for a plant of this kind. Details will be furnished later, but it is not premature to say that the general plan of the testing plant is to run one locomotive after another on the testing platform, where it will rest with its drive wheels on rollers. The tests will begin with the weighing of the cold locomotive as it reaches the testing floor. Fuel and water will be measured, a fire built in the fire box, and when steam is up the engine will be run under its own steam, possibly at the rate of 100 miles an hour, though standing still. Devices for measuring speed, power, &c., will be installed in connection with the rollers, upon which the drive wheels rest. Railroad men from all over the world will come to this exposition to study the testing of locomotives; and locomotives of every type and class, domestic and European, will be tested one after the other under exactly similar conditions. It is understood that this plant will be owned by the Pennsylvania Railroad Company and removed by them to their shops at Altoona, Pa., at the close of the fair.

The Delaware & Hudson Railroad Company have appointed W. J. Mullen industrial agent, with headquarters in Albany, N. Y.

The Mueller Lathe Center Grinder.

A center grinding fixture which may be attached to a lathe ready for use in less than two minutes and detached in a correspondingly short time would certainly seem to remove any reasonable excuses for allowing the hardened centers of a lathe to remain long in anything but a nearly perfect condition. Such a device, as claimed by its makers, is the center grinder shown herewith. The grooved driving plate is attached directly to the nose of the lathe spindle by means of the three clamping levers, which operate as a three-jaw chuck in gripping the threads of the spindle without injuring them. The chuck levers are actuated by rotation of the ring within, whose short slotted arms engage pins fixed in the outer ends of the levers. Rotation of this ring to close the chuck is effected by means of the screw seen in the illustration working through a post on the driving plate and bearing against a lug on the chuck ring.

The grinder mechanism proper is mounted upon the tool block of the lathe, after removal of the tool post. The base piece of the grinder is so arranged that when it is secured to the tool block of the lathe the slide for the grinder must make an angle of 30 degrees with the



MUELLER LATHE CENTER GRINDER.

center line of the lathe, thus assuring an angle of 60 degrees for the taper of the center point. Formed upon one side of the slide is a rack, into which meshes a pinion with hand lever attached; by these means the traverse of the cutting wheel is readily effected. The wheel spindle is arranged for vertical adjustment to permit its being brought to the level of the centers. The intermediate pulleys are supported by an adjustable standard, as clearly shown in the engraving. The round belts used in the driving, when arranged to suit a given length of the standard, require no adjustment for different lathes, the wheel arbor and the main driving pulley on the lathe spindle always occupying the same relative positions. The wheel arbor is set parallel to the lathe spindle; hence there is no twisting of the belts with its attendant disadvantages. The wheel arbor is taper ground, and is provided with a dust cap and with means for taking up wear. The belt pulley sizes are such as to give a speed ratio of about 6 to 1 between the wheel and the lathe spindle. The wheel used is dished to accommodate the angularity between its arbor and the line of its traverse while cutting.

It is stated that the grinder is quite useful for light circular grinding in the lathe, this class of work being best accommodated by use of a plain wheel and of a drum overhead for driving purposes. To extend the usefulness of the machine, a rest attachment, as shown, is fitted in front of the wheel, serving nicely in sharpening small tools and in doing various light jobs of grinding. The grinder is made by the Mueller Machine Tool Company, Cincinnati, Ohio.

The Mechanical Engineers.

Report of the Annual Meeting of the American Society of Mechanical Engineers.

The forty-eighth meeting of the American Society of Mechanical Engineers began with an informal reception on Tuesday evening, December 1, at which time the president delivered the annual address, printed in *The Iron Age* for last week. The closing of the convention was marked by an excursion to the works of the De Laval Steam Turbine Company, at Trenton, N. J. The various sessions between this opening and the most instructive closing were full of interest, and were attended by the usual features of a pleasant and enjoyable nature. A brief account of the business session of Wednesday morning was given in our report of last week, which terminated with the introduction of professional papers. At this time there were presented the three papers reproduced practically in full last week.

What Is the Matter With Piece Work?

Frank Richards' comment upon "What is the Matter With Piece Work?" called forth a very spirited discussion, led by Harrington Emerson, who contributed a somewhat lengthy written argument which compared by diagrams the various systems of paying for labor, and whose nature may be summarized by its author's characterization of the piece work plan as "a lazy, haphazard method of shifting responsibility and direction from employer to employee." The following abstract of Mr. Emerson's discussion will be of interest:

"Just two years ago I was fortunate enough to have F. W. Taylor explain to me his principles of shop direction and the results that he had obtained. It is Mr. Taylor's great merit that he first applied these principles to machine shops, but they are as old as humanity, and consist in setting a definite task, in directing its execution and in apportioning the reward according to the deed. Thirty years ago I made my first acquaintance with these methods in the strictest of strict German schools, where we were put under functional teachers, 10 or 12 different men each day, where we were allotted to the particular classes for which our uneven attainments fitted us—one boy in the highest English and lowest mathematics, his twin brother perhaps in highest mathematics and medium English—where our methods, books, appliances and hours were strictly planned for us, our tasks set to the full limit of our capacity, and where we were rewarded as individuals, not as members of a class. In the middle of the term a boy might be either promoted or debased, yet it was open to each to secure the same highest marks, and with the marks much prized rewards and special privileges. The results in that school were astonishing. The great majority of the boys learned more in 18 months than other schools could teach in four years, because there was no waste time, no waste process, no waste effort; it was time unit study, functional foremanship and differential piece work.

"At our meeting in Saratoga this year Mr. Taylor presented in printed form a full statement of his fundamental principles, and, in my estimation, it will be many years before anything of more than detail value can be added to his work. My copy of his book is worn out with thumbing of the leaves and marking of important passages. I discovered that it would have been easier to mark the few sentences here and there that were not of prime importance.

"What is the matter with piece work? Everything is the matter with it. It is a lazy, haphazard method of shifting responsibility and direction from employer to employee. It works for deception in the latter, and gives us a long string of broken promises from the former; it is hated and opposed by the unions, and with reason. Piece work makes no provision for justice, and any system is wrong that is not based on justice. In some of the great Burlington shops modern steels have been introduced, doubling the output of the workman without extra effort on his part, yet the superintendent of motive power told me that piece work rates would not be changed, and in the Union Pacific shops men came and asked the privilege of paying for their own modern tools if piece rates would be left unaltered.

"The fundamental trouble with piece work, in addition to its lack of justice, is that it makes the workman sell what is not his to sell—namely, output. When J. J. Hill formulated his famous principle that railroad expenses were by the train mile and receipts by the ton mile, neither his train crews nor himself ever dreamed of putting the pay of the men on a tonnage basis. The engineer who hauls 60 80,000-pound cars with a 100-ton engine gets no more than the engineer who obeys orders, standing for hours on a side track. The engineer sells his time, his skill, his intelligence, his obedience, but never output, because that depends on conditions over which he has no control; and it has always been a wonder to me that railroads which manage their train problems should be so backward in their machine shop practices and methods.

"What the employee sells, whether in office or shop, is not his 'output,' but primarily his time and his skill, incidentally his intelligence and his obedience. That many shops pay by piece work is no argument in favor of the plan, since more shops pay by day work, and as Mr. Barth in his slide rule paper, presented at this meeting, only too moderately remarks, the usual way of running a machine shop appears little less than absurd.

"The experiences of Mr. Taylor, Mr. Gantt, Dodge & Day, Mr. Barth, Mr. Parkhurst and myself, who have carefully studied the output and results in innumerable machine shops, prove that the wastes going on are more than absurd. As an example of old practice against new, I hold in my hands the original figures of the skilled and competent engineer of a large shop, who estimated the cost of a certain job at $4575, of which $3300 was for materials and $1275 for labor. The work came under my direction after it was one-third completed and was pulled off with four men in three months for a total cost of $3375.09, of which $622.79 was for labor, netting a profit of $1824.91, instead of $629 as estimated—nearly three for one—yet some of the men on that job were paid a bonus of nearly 100 per cent. above their regular wages. I also hold a routing card of one of my assistants, Mr. Parkhurst, in which a car shop job, marking and moving 200 pieces of oak, was estimated by the foreman to require two days, but was actually completed in 2 hours 25 minutes on a 50 per cent. bonus basis. This is what Mr. Taylor's methods will do when applied to an old time shop.

"In planning jobs of this kind we pay no attention to what has or is being done. Former practices have absolutely no interest for us. We figure out the time the job ought to take under existing conditions and we pay the man a generous bonus, which must be enough to call out the best that is in him. If the conditions appertaining to the job are changed, either for better or worse, we again determine the minimum time and pay the man a bonus for his co-operation. These illustrations show that astounding results follow the plans Mr. Richards condemns without understanding them, and that there is no argument whatever in appealing to present practices. Mr. Richards' diagrams and his reasoning and conclusions are erroneous, because he bases them on output, which does not properly enter into the matter at all, as diagrams based on time instantly show.

"1. *Day Work.*—The employer makes all the gain or loss. He is stimulated to good foremanship and better equipment, but the constant tendency is to deterioration.

"2. *Piece Work.*—This is exactly the reverse of day work. The employee makes all the gain or loss, and is afraid to cut time for fear wages will be cut."

"3. *Halsey Premium Plan.*—The chief merit of this plan is that it obviates the necessity for change in piece rates. It has worked admirably in certain shops steering a halfway course between the injustice of day work and of piece work, but it is not fitted to cope with the unexpected. If there are no improvements by the employer there is no reason why the employee should not get in full the increased result due to his greater diligence and skill, but if improvement is due to the employer's better equipment there is no justice in giving the employee any part of it.

"4. *Taylor Differential Piece Work Plan.*—Here for the first time attention is concentrated on the reasonable maximum of production, and the reward made proportionately great. Not only is there no attempt made to cut piece work prices, but the reward is withheld unless the maximum is done. The great difference between this and ordinary piece work is that Mr. Taylor demands the payment of a high premium, often 100 per cent., a figure that would frighten most employers, in order to effect maximum reduction in cost. If the employer introduces improvements, times are with justice shortened, but not the premium per hour; if equipment deteriorates times must be lengthened, but the same premium be paid per hour.

"5. *Gantt Bonus System.*—The difference between the Taylor and Gantt plans is that the former pay by the piece finished in a definite time, while the latter pays by the definite time for a completed job and pays the bonus, not for the piece, but for following instructions.

"After careful study of the Taylor and Gantt diagrams, Mr. Parkhurst and myself, adhering absolutely to the Taylor and Gantt theory of time unit study and specific directions of all operations, have used other diagrams, less severe than Taylor and Gantt, and permitting us, in an old shop, where tool, machine and labor conditions are not modern, to keep the ideal always in view, yet we reward any gain shown by the workman. We determine with all the skill at our command the time a job should take, and adopt the Taylor line —based, however, on time and on piece—and then run back to the day line. We begin with the scientific maximum of output and reward for endeavor, and as a mere matter of shop convenience curve backward to the day rate line. When all conditions are properly under control, I much prefer the Taylor diagram based on time. There is something inspiriting in working out a minimum time, in knowing that it can be made with the regularity that a train makes its fast schedule, in proving it, in stimulating the workman to it; but it is equally discouraging to workman, to expert and to employer to be wrecked in full flight by hard iron from the foundry, by variable speed in the engine, by broken belt on main shaft, by any unforeseen and unforeseeable delay, and in such cases the curve back to day rate prevents much trouble.

"In all these diagrams, except day rate, the employee is benefited by reduction in time; in all these diagrams, except piece work, the employer is benefited by reduction in time. And reward for reduction in time is apportioned exactly as it should be, only by the Taylor method and its modifications. The employer must pay big bonuses or he cannot get results. He can afford to pay big bonuses, for even if he gives all the gain in time to the employee he makes on increased efficiency of plant and diminished overcharges."

Mr. Gantt: I want the best man in our shop to make the instruction sheet and be the teacher. The best man we have. That man can do the work; make him the instructor, and I think all objections to the bonus system will be swept away. His knowledge is made the common knowledge of the whole shop.

Oberlin Smith: There is one feature which needs further investigation by these gentlemen who have made so deep and earnest study of the subject of how to pay for labor. Everything thus far said and done seems to apply only to manufacturing plants. We must differentiate machine shops. In the jobbing shop—making little odd things for different people, or making repairs—clearly little can be done except by day work. It is almost impossible to do anything else. At the other extreme is the manufacturing plant, where hundreds or thousands of articles are made alike, or nearly so, or of which the component parts are alike. Of course, these various systems of payment are applicable to these shops and seem to have been studied with direct reference to them. Probably the great majority of shops are of an intermediate kind, in which class my own experience has happened to be, so far as executive work is concerned. In our place, where we make presses and dies, the dies are practically all different and have to be worked in a department by themselves. It would be very difficult to apply to articles of this kind any system of piece work or premium payment. In the other department we make 500 kinds and sizes of things, in a small shop employing 150 to 200 men, and for a market not demanding large quantities of one kind. Here, too, I think it would be difficult to put any of these special plans of payment into effect. The question arises as to how to manage work of this kind; whether the cost of bookkeeping and watching required on work in lots of one to ten pieces would pay. I have tried the premium plan and piece work a little, and have generally fallen back on day work and close watching. I am anxious to know whether this plan can be applied to very small batches of work, and I hope some of these gentlemen who have made such a study of the matter will say something about it for the benefit of myself and others.

Fred. W. Taylor: I wish again to say what most of you have heard a number of times, but perhaps some have not yet heard—that to my mind there is no quarrel between the various systems of paying men. Each of these systems has its proper place; all of these systems, or most of them—four or five of them at least—could properly be in use in the same shop at the same time, providing the shop is large enough. Almost every large manufacturing plant—certainly every large machine shop—should have four—I should say not less than four—systems of payment going at once in order to pay its men in the best possible manner. There certainly can be no quarrel between day work and piece work and Mr. Gantt's bonus plan and differential rate system of payment. There is no conflict between them; they all have their own fields of usefulness, and I feel quite convinced that each one has a field that it is impossible for the other system to entirely fill. And again, outside of the four mentioned, I think the Rowan-Halsey premium plan has a field of usefulness, Mr. Richards to the contrary notwithstanding. But back of all the systems of paying men, and of fundamentally more importance than any system, lies the fundamental difficulty of managers and their workmen—namely, that in most cases neither the one nor the other knows what a day's work really is in any particular kind of work. That is, it is the rarest possible case that either the management or the men know what a really first-class man is capable of doing if he goes at it with the best implement, with proper appliances, and with determination and a will to do everything that he can do. What I maintain and feel absolutely sure is that the full and proper solution of the wages question—as to which system shall be employed and the amount of compensation to be paid—lies in a study of how much each man should do, or could do, or ought to do. It is this study, this accurate study of how long he ought to take to do a job of work, which is of so much greater importance than the adoption of any one system of paying men that the latter sinks almost out of sight, or ought to sink out of sight. I wish to repeat—and I apply it to anything, either to miscellaneous work or to work repeated over and over again, for it is just as possible to obtain information on miscellaneous work as it is on work that is done day after day, when the owner or the manager is once in possession of the exact knowledge of how long it ought to take to do work—that with the knowledge of how long a job should take, even the day work plan of paying, which is perhaps in many cases the least satisfactory, will produce much larger results than will any of the other systems without this knowledge.

Mr. Du Brul: Papers on shop management usually state that no difficulty is encountered from opposition of workmen to the introduction of the system. I don't know many foundries running outside of ordinary piece work in which the union is not perfectly able to and very generally does limit the production and does hold down the output of the men, but there are very few foundries running on any other systems than straight day work or straight piece work. How long will it be before these conditions begin to apply in the machine shops? We must not forget this other element in the problem. There is considerable the matter with piece work. Perhaps not so much with piece work as with the men who are trying to run it. The great difficulty is with the manager.

Mr. Taylor: The most difficult element in determina-

tion of the time required for doing a job is the knowledge of just what can be done on any kind of iron or any kind of steel, with any particular tool, with any depth of cut, and with any feed. And that is the problem which is much more difficult than the question of how long it takes the individual man to handle this or that piece. By stop watch observations it is a comparatively simple matter for a man who devotes his whole time to the study of the problem of finding how long it takes to do work to ascertain how long a time is required to handle any particular piece. When that is analyzed into its elements the question of handling the pieces or elements becomes comparatively simple. Data for these calculations are determined by a series of careful stop watch observations made by a man whose business it is to make stop watch observations, just as drawings are made by a man whose business it is to make drawings. Sooner or later these data will be tabulated, just as the elements of engineering have been tabulated, and there will be any number of books, and one can see just how long it takes to do this, that and other small elements of machine work. The hand work should be determined by stop watches, and can only be determined by the individual at his own shop. Sooner or later that will all be put in books and most of the problems will be answered.

Modifying Systems of Management.

Mr. Gantt's paper on "Modifying Systems of Management," printed last week, was next read. Mr. Parker, in discussion, asked what is done in Mr. Gantt's system to make it to the foreman's interest to push the plan to its limit of usefulness. Mr. Gantt replied that no difficulties had been experienced along that line, as the practice was to give the foreman a bonus proportional to that earned by the men under him, thus making it to his interest to aid the men in every possible way to the earning of bonuses, and making it more to his interest to help the poorer workmen than those who less need his attention.

What Are the New Machine Tools to Be?

Professor Sweet's paper, on "What Are the New Machine Tools to Be?" was the last one read at the Wednesday morning session. The suggestions thrown out in the paper, as published last week, were well received, and were added to by various participants in the discussion. The need of many and fundamental changes in design to meet the requirements and develop the possibilities of the new high speed tool steels was emphasized by all who spoke. An interesting point brought out was that the high speed steels, while able to endure the burning and abrasion due to greater cutting speeds, are really weaker than the carbon steels. Mr. Taylor stated that the tungsten and molybdenum in these steels have a weakening effect, which it seems impossible to prevent. This fault is not of great practical effect, however, as altering the value of the steels, since the form and size of the tool may be made such as to withstand the heavy pressures due to the increased speed and feed which the cutting edges will endure.

After adjournment the members were served with luncheon in the society house, whence various parties started later for tours of inspection of some of New York's large power houses.

THURSDAY'S SESSIONS.

The sessions of Thursday morning and afternoon were held at Stevens Institute of Technology, Hoboken, N. J., where the forenoon was devoted to reading and discussion of papers, and the afternoon to a most interesting and instructive lecture by Hans Goldschmidt of Essen-Ruhr, Germany, his subject being "Alumino-Thermics and Their Application to Engineering and Metallurgy." Numerous interesting demonstrative experiments illustrating the use of "Thermit" in welding rails, repairing fractures, preventing "piping" in steel ingots, welding pipes end to end, &c., were made in view of the assemblage. Between the morning and afternoon sessions luncheon was served in the Carnegie Laboratory of the institute, and visits of inspection about the laboratory and various buildings were made under the guidance of students of the school.

The papers at the morning session began with that of Mr. Gregory, on "The Pitot Tube," wherein the author described various experiments made with a view to determining the most efficient form of this device for accurate measurement of the velocity of motion of fluids. Several forms of tubes, including those discarded as unreliable, were illustrated and their laws and applications discussed. The paper provoked no general discussion.

Mr. Perry next read his paper on "A Method of Determining Rates and Prices for Electric Power." The paper called attention to various errors and points of injustice to both producer and consumer in the stepped rate system of prices for electric supply, and developed a formula for a system which Mr. Perry believed to be fair and practical, including diagrams and a table showing the difference between the stepped system and the one proposed. In discussion Mr. Hale expressed a belief that the block system is a good one; that of selling the first, say, 2000 kw. at, perhaps, $31, the next 2000 kw. at $29, the next at $28, &c. By thus lessening the prices on higher amounts a fairly reduced average rate is obtainable without the faults due to the stepped system. Mr. Hale urged that "the most important feature in determining rates, entirely omitted by Mr. Perry, depends on the difference between kilowatts and kilowatt hours. Thus 2000 kw. used in a year of 3000 hours is 6,000,000 kw. hours. If, now, the amount should be determined by a kilowatt hour meter of the ordinary recording type, the customer might use the 6,000,000 kw. hours during only 1500 hours of the year, using 4000 kw. during that time. The kilowatt hour meter would still show 6,000,000 kw. hours as before, but the central station would have to have twice the investment in equipment that would be needed if the current was used during 3000 hours, and the central station would lose money. If, on the other hand, the customer used the 6000 kw. hours during 20 hours per day, or 6000 hours per year, day and night service, then the central station would require but 1000 kw. of machinery—only half the investment—and would make a much greater profit. There are a great many systems in use by central stations for taking care not only of that which forms the argument of Mr. Perry's paper, but of many other important features that must be considered." In closing the discussion Mr. Perry stated that he had found in looking over the sheets as ordinarily sent out by central stations, even taking into consideration the discounts, a confliction of rates as well as of prices; that when the rate is diminished it will be found that a larger amount of power may be procured than by the previous rates for the same amount of power; and that his paper was the direct outcome of a series of rates proposed by a central station in New England for a large cotton mill, the absurdity of their rates being even more pronounced than brought out in his paper.

Following Mr. Perry, Professor Jacobus reported certain "Tests of a Compound Engine Using Superheated Steam." The water consumption of the engine was found to be an average of 9.67 pounds per horse-power per hour with superheated steam and at various loads, as against 13.84 pounds with saturated steam. Comparison of these figures should not be made directly, as the engine cylinder ratios were not such as to be most economical under conditions of saturated steam operation. Asked, in discussion, as to what is the best cylinder ratio for use of superheated steam, Professor Jacobus replied that no definite statement can as yet be made. Cylinder ratio in the engine tested was about 3 to 1, which Mr. Wright stated was adopted by the builders with a view to following closely the foreign practice, presumably dictated by experience. Professor Goss inquired whether Professor Jacobus' study of the subject had led him to believe the use of superheated steam in compound engines a justifiable practice. The reply was that thus far the saving by use of superheated steam is not fully realized in a simple engine, and that economy is to be expected from compounding.

Edward F. Miller next presented his paper on "The Pressure Temperature Curve of Sulphurous Anhydride

(SO_2)," which gave tables and a diagram of the properties of this substance, coming into prominence in connection with "binary vapor" or "waste heat" engines.

The "Construction and Efficiency of a Fleming Four-Valve Engine Directly Connected to 400-kw. Generator" were described in a paper by Benjamin T. Allen. The discussion took the general trend of consideration of the type of engine described and of questions as to the accuracy of the results and conclusions derived from the tests and recorded in the paper.

Carl G. Barth next presented his subject of "Slide Rules for the Machine Shop as a Part of the Taylor System of Management." This paper illustrated and described a set of slide rules for use in determining the unknown or desired factor in a machining process when other factors are known or may be closely estimated or safely assumed. In presenting the subject, Mr. Barth showed a number of diagrams of curves plotted from results of very extensive series of experiments in the various processes of machine shop practice. Great interest was shown in the surprisingly practical and valuable nature of Mr. Barth's work, and none would likely question his right to characterize the methods in vogue at the average shop as "absurd"—at least, as compared to the apparent absence of guesswork in the conclusions to be derived from experiments possible, if not practicable, at almost any plant. Mr. Barth was very amusing in his presentation of the subject, and his hearers were well entertained, as well as highly instructed, by his talk.

Following Mr. Barth came F. A. Scheffler with some "Suggestions for Shop Construction." This paper, like that of Mr. Barth, was on the programme for Wednesday, but had been crowded out for lack of time and postponed until Thursday. Mr. Scheffler presented a sort of "round robin" scheme for shop arrangement, the administrative departments, drawing office, &c., being housed in a central polygonal structure, placed within an inclosure of corresponding form, from the several sides of which the various shops of the plant radiate as the spokes of a wheel. The advantages of this arrangement, as stated, include proximity of all departments to the offices, and to each other at one end, ample yard spaces between the shops, convenience of transportation within, among and from the shops, indefinite extension radially outward to the limit of the factory site, &c. The suggestions of Mr. Scheffler were received with interest, but no important discussion developed.

Thursday evening was set aside for the annual reception and dance at Sherry's. The affair was unusually well attended and was evidently thoroughly enjoyed.

FRIDAY'S BUSINESS AND EXCURSION.

The session of Friday morning was held at the society house, where the remaining papers were presented. The first was that by C. H. Morgan, on "A Compact Gas Engine, Beam Type," describing a recently developed engine especially designed to utilize blast furnace gases as fuel. Discussion brought up the error in the common belief that the impulse upon the piston of an internal combustion engine is in effect a blow of more or less severe character. Professor Reeve urged that a blow necessarily involves velocity, of which there is none possible in the case of gas at point and time of ignition in a combustion engine. The explosion is a process of combustion, requiring time for its accomplishment and probably generally approaching the conditions of impact much less nearly than is the case in the steam engine, where the steam is admitted at high velocity, striking upon the piston a blow whose effect is well known as affecting steam engine maintenance. As a matter of fact the combustion engine gives a very uniform crank effort. B. F. Thwaite of England was invited to speak of his experience with blast furnace gas engines. He emphasized the fact that it is wrong to regard the gas engine as an explosion engine, since the burning of the charge is progressive and not instantaneous. Speaking of the reputed "leanness" of blast furnace gas, he called attention to the dilution of the richer gases with larger proportions of air in gas engines, thus bringing them to an equally "lean" condition in actual use. That blast furnace gases have given trouble in engines he attributed entirely to the presence of dust and not at all to lowness of calorific value. He stated that he has now entirely obviated even this difficulty, by means of his cleaning apparatus, illustrated and described in *The Iron Age* for last week. Regarding the suggested use of gas engine exhaust in heating the blast stoves, Mr. Thwaite called attention to the fact that the exhaust gases are not above about 500 degrees in temperature. Halving this amount shows little usefulness for blast heating. Mr. Thwaite stated that the best thermal results are to be obtained for piston speeds of about 800 to 900 feet per minute; that blast furnace gas is ideal for power purposes and that the present wastes of this power are of extreme value.

Mr. Uehling: There is no question before the mechanics, and especially the iron manufacturers, of this country of greater importance than that of the utilization of blast furnace gases. Some time ago I took the pains to determine, as nearly as might be, the power that is wasted in the manufacture of iron. I found that there were in excess of 1,750,000 horse-power going to waste with the rate of manufacture as it was about a year ago. And since then I have had the opportunity of investigating the cases of several plants and I find that my figures are too low. I found that there was available for outside purposes, over and above the requirements of the blast furnace itself and the heating of the blast stoves, 800 horse-power per ton of iron produced per hour. There is one plant, for instance, where there are four blast furnaces and large works besides, where they would require about 20,000 horse-power for blast furnaces and all, and they would have, after supplying all the power required to run their works, about 18,000 horse-power for sale. The plants do not all come out the same, because it depends on the character of the iron they make and the fuel and the character of ore that they have to reduce; but the power available is in no case less than 800 horse-power per ton of iron manufactured per hour. There seems to have been, especially in this country, great hesitancy in receiving this idea of utilizing blast furnace gases, and on the first casual glance it seems as though there could not be much of it, because the gas is very clean; but, as already stated, it is an ideal gas for internal combustion engines, and when you come to figure it out it does not differ very much in composition of the explosive mixture in the engine from a very strong gas, because with illuminating gas you have to add from six to ten times—I think about eight or nine times—the quantity of air to make the explosive mixture. Now, in blast furnace gas 0.7 of the volume is all that is theoretically required, and you add about one to one, I think. [Mr. Thwaite: That is right; one to one.] Now, in your blast furnace gas you have 25 per cent. combustible, and in your illuminating gas we may assume you have 100; but you add air, which is nearly 80 per cent. nitrogen. Besides, the elements which are in the illuminating gas do not lend themselves to the high compression and you are liable to get premature explosions; whereas the elements in the blast furnace gas not only lend themselves to compression, but it is necessary that they should be compressed in order to get the explosion with certainty, due to the large excess of carbon dioxide, which is a great retarder of combustion.

Mr. Supplee: I understand that in gas engines using gases of various calorific powers, the compression to get the best results should be inversely as the calorific power; the leaner the gas the higher the compression.

Mr. Thwaite: That is correct; that is quite a safe rule to follow.

The next paper, that on "Standard Unit of Refrigeration," by J. C. Bertsch, was read by the secretary in the absence of the author. The paper made a plea for the establishment of a rational and reasonable unit by which to rate the capacity of refrigeration machinery and appliances. Present conditions in this respect were discussed, and a basis of standardization outlined. The paper was discussed quite freely, but to no definite result.

Prof. W. F. M. Goss then described his recently developed "Series Distilling Apparatus of High Efficiency," wherein

the liquid to be evaporated is passed successively through a series of chambers heated progressively hotter by the distillate returning through central tubes passing the several chambers in inverse order. High efficiency is attained by the fact that the only losses are by radiation and the only heat cost is that applied to make up the difference in temperature between the entering liquid and the issuing distillate. In discussion, Mr. Supplee inquired wherein the system described differs from the familiar multiple-effect distilling apparatus used commonly on seagoing ships. Professor Goss replied that, as he understood it, in the apparatus to which Mr. Supplee referred, there is some loss due to the fact that the steam of distillate issuing from each chamber is allowed to cool without assisting in the process by yielding its heat usefully. In this way each chamber delivers its distillate separately, while in the series apparatus just described the distillate passes the chambers in series, giving up its heat progressively and issuing in a single stream from the chamber of lowest temperature.

The secretary next read Max H. Wickhorst's paper, describing "Apparatus and Methods for Testing Air Motors and Air Hammers." This, after very brief discussion, was followed by Sterling H. Bunnell, with his paper on "An Improvement in Valve Motion of Duplex Air Compressors." There was no discussion of this paper, which concluded the list for this meeting. Topical discussions were the only remaining subjects for consideration, and these were unfortunately not taken up, owing to the lack of time. It will be generally agreed that much of the time wasted by the extended reading of certain of the papers, with which the members interested were presumably already familiar, might much more profitably have been reserved and devoted to the discussion of the topical subjects, many of which would doubtless have brought out points of greater interest and value than appeared in several of the regular papers. Means should be taken in future to curtail waste of time in presentation of papers, or, in other ways, make it sure that the topical discussions be not crowded out.

President Dodge, appointing the committee to look up the history of the society, its property, relics, &c., and to prepare a memorial volume, which may make suitable record of these matters for the benefit of present and future inquirers, named the following members: John E. Sweet, C. W. Hunt, H. H. Supplee.

It was announced that the society had been presented with a plaster bust of Ericsson, and a vote of thanks was given the donor.

Memorial resolutions on the death of the society's first president, Prof. R. H. Thurston, were presented and adopted.

Announcement was made of the death, on December 1, of Sir Frederick Bramwell of London, England, honorary member of the society.

Mr. Rockwood brought up the subject of relieving the New York City members of the financial burden connected with the special features of the annual meetings, suggesting action leading to its division among all those attending. Mr. Halsey stated that the New York members accept this expense as representing a return for greater advantages enjoyed by reason of residence near the society headquarters. Mr. Miller advised increase of dues of New York City members and those living in the vicinity of that city. Mr. Engel advised discontinuing expensive social features, as not exactly in keeping with the purpose of the society as an engineering organization. On motion of Mr. Hunt the matter was referred to the new committee of the council covering matters of this nature.

Mr. Hunt moved that the society membership be advised by circular as to the present status of the Carnegie engineering building project. This was referred to the council.

President Dodge called his successor, Ambrose Swasey, to the platform, assuring him of his personal regard and his pleasure in welcoming him to the office.

On motion the meeting then adjourned. The spring meeting will be held in Chicago, as already announced.

Immediately after adjournment a large representation of the members and guests present, including several ladies, proceeded to the Pennsylvania Railroad station in Jersey City, where a special train of four coaches was in readiness to convey the party, numbering 187, to the works of the De Laval Steam Turbine Company, at Trenton, N. J. Management of the excursion was in the hands of Edward S. Lea, sales manager for the De Laval Company, and Charles B. Rearick, manager of the New York office of the D'Olier Engineering Company, sales agents for the De Laval turbines. The train ran through to Trenton without stop, luncheon being served by the De Laval Company to the members of the party in the coaches *en route*. Arriving at Trenton the train was switched directly into the yards of the De Laval works, where it remained while about two and a half hours were spent by the visitors in thorough inspection of the works, the methods of manufacture and the products themselves. The various component parts of the turbines in several sizes were displayed, suitably tagged for the information of those not familiar with the construction of the machine, whose name and performance are, however, so well known. In the testing room were several machines in operation, some of them supplying the electric power for the works, so that the turbo-generator in the power house was relieved of its regular load. This machine was opened for display of its essential parts, a notice suspended above the turbine chamber stating that the machine had been in actual operation for a period equivalent to three years, and that it was then for the first time opened. Inspection of the vanes of the turbine disk discovered no sign of wear or other deterioration of the surfaces. In the machine shops a matter of special interest was the production of the gearing which constitutes so vital a part of the De Laval machines. Large gears were shown in process of grinding with powdered glass and oil, slowly working off the roughness left by the gear cutters. The newly developed De Laval contrifugal pumps—single and two-stage, for low and high pressures—were on exhibition, both standing and in operation. The visit to the works was much enjoyed, and great credit for its inception and succses is due to the hosts of the occasion and to the gentlemen already named as having directed the whole affair.

Following is a list of members registered at the meeting. The total registration was 820, thus making this convention one of exceptional size in this respect. Only one previous meeting has had a larger registration, that at Boston in May, 1902, and in that case the register of attendance was swelled by special invitation. As a regular meeting, then, the one just closed must be regarded as establishing a record for registered attendance of the normal nature.

Members in Attendance.

Abercrombie, James H., Newark, N. J.
Ackerman, William S., New York.
Adams, Henry, Baltimore.
Alden, George I., Worcester, Mass.
Aldrich, Herbert L., New York.
Alexander, Louis A., Ansonia, Conn.
Allen, Charles M., Worcester, Mass.
Almond, Thomas R., Brooklyn, N. Y.
Almy, Darwin, Providence, R. I.
Arnold, G. L. H., Catasauqua, Pa.
Ashley, Frank M., New York.
Aue, Joseph E., New York.
Austin, William S., New York.
Bagg, Samuel F., Watertown, N. Y.
Bailey, W. H., New York.
Baldwin, Stephen W., New York.
Ball, Frank H., Plainfield, N. J.
Bang, H. A., member local Reception Committee, New York.
Barnaby, Charles W., New York.
Barnay, John M., New York.
Barr, Harry P., East Orange, N. J.
Barr, John H., Syracuse, N. Y.
Barth, Carl G., Swarthmore, Pa.
Bates, Albert H., Cleveland.
Bates, Edward P., Syracuse, N. Y.
Bauer, Charles L., Springfield, Ohio.
Bayley, W. D., New York.
Baylis, Robert N., Englewood, N. J.
Beach, Giles, Gloversville, N. Y.
Billings, Charles E., Hartford, Conn.
Birkinbine, John, Philadelphia.
Boehm, William H., New York.
Bole, William A., Pittsburgh.
Boller, Alfred P., Jr., East Orange, N. J.
Bolles, Frank G., Norwood, Ohio.

Bolton, Reginald P., New York.
Bond, George M., Hartford, Conn.
Bonner, William T., Boston.
Bowman, Austin L., New York.
Boyer, Edwin S., New York.
Bradley, W. H., New York.
Brady, James, Brooklyn, N. Y.
Brenner, William H., Yokohama, Japan.
Briggs, Thomas H., Brooklyn, N. Y.
Bristol, W. H., Hoboken, N. J.
Brooks, Morgan, Urbana, Ill.
Brown, Frank G., Jr., Troy, N. Y.
Brown, J. G., Jersey City, N. J.
Brown, John J., New York.
Brown, Robert S., New Britain, Conn.
Bruegel, Adolph T., Philadelphia.
Bryant, F. J., Phillipsburg, N. J.
Bulkley, Henry W., East Orange, N. J.
Bullard, Dudley B., Bridgeport, Conn.
Bunn, Frank W., Philadelphia.
Bunnell, Sterling H., Lorain, Ohio.
Burns, A. L., New York.
Carew, Clement J., Franklin, Pa.
Carpenter, Henry A., Sewickley, Pa.
Carpenter, Rolla C., Ithaca, N. Y.
Carroll, Elbert H., Worcester, Mass.
Cary, Albert A., New York.
Case, Theodore N., Mt. Vernon, N. Y.
Cash, Arthur W., Newark, N. J.
Cassier, Louis, New York.
Cattell, William A., Montclair, N. J.
Chamberlain, Paul M., Chicago.
Chambers, F. G., Syracuse, N. Y.
Chase, Harvey F., Boston.
Child, Edward T., Philadelphia.
Childs, Eugene, Boston.
Christie, James, Pencoyd, Pa.
Christie, W. W., Paterson, N. J.
Clegg, Robert I., Cleveland.
Cluett, Albert E., Troy, N. Y.
Coburn, Howard L., Boston.
Coghlin, John P., Worcester, Mass.
Cole, Edward S., New York.
Cole, Francis J., Schenectady, N. Y.
Colles, George W., Flushing, L. I., N. Y.
Colvin, Fred. H., East Orange, N. J.
Colwell, Augustus W., New York.
Connell, James A., New York.
Conover, Edwin K., New York.
Conrad, Hugh V., New York.
Cooke, Harte, Auburn, N. Y.
Corbett, Charles H., Brooklyn, N. Y.
Cowperthwait, Allan, Philadelphia.
Cremer, James M., Brooklyn, N. Y.
Crooker, Ralph, Jr., Pittsburgh.
Crosby, William W., Woburn, Mass.
Cullingworth, George R., Mt. Vernon, N. Y.
Cummings, Orrie P., New York.
Dallett, W. P., Philadelphia and Media, Pa.
Davenport, E. W., Passaic, N. J.
Davis, Charles E., Rockford, Ill.
Davis, Robert G., Brooklyn, N. Y.
Dawes, Herbert N., Boston.
De Wolfe, Edward C., Brooklyn, N. Y.
Dinkel, George, Jr., Jersey City, N. J.
Dodge, James M., president 1902-03, Philadelphia.
Dodge, Kern, Philadelphia.
Dow, Alexander, Detroit, Mich.
Du Brul, Napoleon, Cincinnati.
Duehner, Henry L., Jr., Rochester, N. Y.
Dunn, Charles, New York.
Durand, William F., Ithaca, N. Y.
Eberhardt, Frederick L., Newark, N. J.
Eberhardt, Henry J., Newark, N. J.
Edwards, Victor E., Worcester, Mass.
Elmer, William, Jr., Altoona, Pa.
Emerson, Harrington, London, England.
Emerson, R. W., Niagara Falls, N. Y.
Emory, Frederick L., Morgantown, W. Va.
Engel, Louis G., Brooklyn, N. Y.
English, William T., Boston.
Ennis, William D., Paterson, N. J.
Evans, Henry O., Philadelphia.
Evans, Quimby N., Brooklyn, N. Y.
Fairfield, Howard P., Worcester, Mass.
Farwell, Elmer S., New York.
Faulks, James B., East Orange, N. J.
Feldman, Abram M., Albany, N. Y.
Fellows, Edwin R., Springfield, Vt.
Fernald, Robert H., St. Louis.
Finley, A. D., Port Chester, N. Y.
Fladd, Frederick C., Brooklyn, N. Y.
Fleming, William R., Harrisburg, Pa.
Flinn, Thomas F., Brooklyn, N. Y.
Flint, Bertram P., New York.
Foran, George J., New York.
Foster, Ernest H., New York.
Fox, William, New York.
Freeman, Stuart E., St. Louis.
French, Lester Gray, member local Reception Committee, East Orange, N. J.
Frevert, H. F., New York.
Frith, Arthur J., New York
Fritz, John, Bethlehem, Pa.
Furman, Franklin De R., Hoboken, N. J.
Gabriel, Charles R., Providence, R. I.
Gabriel, William A., Elgin, Ill.
Gantt, Henry L., Schenectady, N. Y.
George, J. R., Worcester, Mass.
Giles, C. E., Providence, R. I.
Gillis, H. A., Richmond, Va.
Gnade, Edward R., Oil City, Pa.
Goetz, Victor J., New York.
Goetze, Frederick A., New York.
Gordon, Henry D., East Orange, N. J.
Gorton, John C., Schenectady, N. Y.
Goss, W. F. M., Lafayette, Ind.
Gould, Webster V., Mt Vernon, N. Y.
Green, Samuel M., Holyoke, Mass.
Greenleaf, George E., Plainfield, N. J.
Greensmith, James E., Taunton, Mass.
Gregory, William, Brooklyn, N. Y.
Grohmann, Carl L., New York.
Gulowsen, G. A., Staten Island, N. Y.
Gump, Walter B., Dayton, Ohio.
Hackstaff, John D., Brooklyn, N. Y.
Hagy, J. L., Philadelphia.
Hale, Robert S., Boston.
Hall, Frederick A., Closter, N. J.
Hall, Robert E., Plainfield, N. J.
Hall, Willis E., Philadelphia.
Halsey, James T., Philadelphia.
Hamilton, James V., Brooklyn, N. Y.
Hammett, Hiram G., Troy, N. Y.
Hammond, Richard, Buffalo, N. Y.
Hannah, Frederick A., Medford, Mass.
Harrington, Harry C., Newark, N. J.
Hartness, James, Springfield, Vt.
Hayward, Henry S., Jr., Franklin, Pa.
Haywood, D. H., New York.
Henning, Gustavus C., New York.
Henshaw, Frederick V., member local Reception Committee, Brooklyn, N. Y.
Hewlett, Edward M., Schenectady, N. Y.
Higgins, John W., Worcester, Mass.
Higgins, Milton P., Worcester, Mass.
Hill, John W., Pittsburgh.
Hill, Warren E., Brooklyn, N. Y.
Hiller, N. H., Carbondale, Pa.
Hillmann, Gustav, Brooklyn, N. Y.
Hitchcock, Frederick M., New York.
Holbrook, Dio L., New York.
Holt, Frank E., Jersey City, N. J.
Hopkins, George G., Jr., Springfield, Ohio.
Hoppes, John J., Springfield, Ohio.
Hopton, Lemuel, R., Plainfield, N. J.
Horning, Julius L., Jersey City, N. J.
Horton, John T., Brooklyn, N. Y.
Houghton, Charles E., New York.
Hoxie, William D., New York.
Hughes, Edward F., Watertown, Mass.
Humphrey, George S., West New Brighton, S. I., N. Y.
Hunt, Charles W., member local Reception Committee, New York.
Hunt, William F., West New Brighton, S. I., N. Y.
Huson, Winfield, S., Derby, Conn.
Hutton, Frederick R., secretary, New York.
Idell, Frank E., member local Reception Committee, New York.
Isham, Henry S., New York.
Jacobi, Albert W., Newark, N. J.
Jacobs, Ward S., Hartford, Conn.
Jacobus, D. S., member local Reception Committee, Hoboken, N. J.
Jacques, William H., Boston.
Jefferies, E. A. W., Montrose, Col.
Jenks, Llywellyn H., Rutherford, N. J.
Jennings, Edward L., Waterbury, Conn.
Jennings, Edward M., Winthrop, Mass.
Jewell, Charles W., New York.
Johnson, Arthur E., Washington.
Johnston, Archibald, Bethlehem, Pa.
Jones, Forrest R., Ithaca, N. Y.
Jones, Horace K., Hartford, Conn.
Jordan, Samuel S., New York.
Kafer, John C., New York.
Kaup, William J., Brooklyn, N. Y.
Keep, William J., Detroit, Mich.
Kent, Ellis C., Gwynedd, Pa.
Kent, Robert S., Brooklyn, N. Y.
Kent, William, Syracuse, N. Y.
Kerr, C. V., New York.
Keyes, Frederic H., Newtonville, Mass.
Kimball, Dexter S., Pittsfield, Mass.
King, Charles C., New Brighton, S. I., N. Y.
Laforge, Frederick H., Waterbury, Conn.
Lane, Henry M., Cleveland.
Lanza, Gaetano, Boston.
Lape, Willard E., East Orange, N. J.
Lea, Edward S., member local Reception Committee, Rutherford, N. J.
Leavitt, E. D., Cambridge, Mass.
Leighton, Robert E., Bayonne, N. J.

Lepper, John G., Hoboken, N. J.
Lewis, David J., Jr., South Orange, N. Y.
Lewis, Wilfred, Philadelphia, Pa.
Libbey, Joseph H., West Newton, Mass.
Libby, Samuel H., East Orange, N. J.
Lieb, John W., Jr., member of local Reception Committee, New York.
Logan, John D., Flushing, L. I., N. Y.
Longstreth, Charles, Philadelphia.
Lorenz, William A., New York.
Loring, Charles H., Brooklyn, N. Y.
Louer, Lewis S., Chicago.
Low, Frederick R., Passaic, N. J.
Lyall, William L., Passaic, N. J.
McArthur, Robert, Biddeford, Maine.
McBride, James, Brooklyn, N. Y.
McGowan, Francis X., New York.
McGregor, John A., New Bedford, Mass.
McKiever, William H., New York.
MacLaren, Malcolm N., Newark, N. J.
Manning, Charles H., Manchester, N. H.
Marble, Harry M., New York.
Mason, Daniel A., New York.
Matthews, Edwin S., Washington.
Mayo, John D., Torrington, Conn.
Mayo, William B., Everett, Mass.
Meier, E. D., member local Reception Committee, New York.
Melville, George W., Washington.
Merriam, Henry P., New York.
Mesta, George, Pittsburgh.
Meyer, Henry C., member local Reception Committee, Montclair, N. J.
Miller, Alexander, Jersey City, N. J.
Miller, Fred. J., member local Reception Committee, East Orange, N. J.
Miller, Lebbeus B., Elizabeth, N. J.
Miner, Max H., Chicago.
Monaghan, William F., member local Reception Committee, New York.
Monroe, William S., Chicago.
Montgomery, H. M., New Rochelle, N. Y.
Moore, D. G., Elizabeth, N. J.
Moore, M. F., Roselle, N. J.
Morehouse, William S., New York.
Morford, Thomas E., New York.
Morgan, Ralph L., Worcester, Mass.
Morris, Henry G., Philadelphia.
Morse, William H., Worcester, Mass.
Mossberg, Frank, Attleboro, Mass.
Moulthrop, Leslie, New Haven, Conn.
Muller, Teile H., New York.
Murray, Thomas E., Brooklyn, N. Y.
Nash, Lewis H., Brooklyn, N. H.
Nason, Carleton W., New York.
Neff, Elmer H., New York
Newell, Harvey E., Yonkers, N. Y.
Nichols, William W., Baltimore.
Nickerson, Alvano T., Jr., New York.
Norris, Henry M., Cincinnati.
Norris, J H., Brooklyn, N. Y.
Ode, Randolph T., Providence, R. I.
Odell, William H., Yonkers, N. Y.
Orrok, George A., Brooklyn, N. Y.
Osbourn, Millard P., Merchantville, N. J.
Parker, Charles D., Worcester, Mass.
Parsons, H. de B., New York.
Patterson, A. W., Jr., Tarrytown, N. Y.
Patton, John H., Brooklyn, N. Y.
Penney, Edgar, Newburgh, N. Y.
Perkins, Thomas C., Hartford, Conn.
Perry, Frank B., Providence, R. I.
Phelps, Frederick A., Newark, N. J.
Piez, Charles, Philadelphia.
Platt, Wilber O., Oil City, Pa.
Pollak, Charles P., New York.
Poole, Herman, New York.
Powell, Emery H., Scranton, Pa.
Pratt, Charles R., member local Reception Committee, Montclair, N. J.
Preston, George B., New York.
Prosser, Thomas, Brooklyn, N. Y.
Pryor, Frederick L., Hoboken, N. J.
Quimby, William E., member local Reception Committee, New York.
Rand, Jasper R., Montclair, N. J.
Rankin, Thomas L., Sackett's Harbor, N. Y.
Rearick, Charles B., member local Reception Committee, New York.
Reeve, Sidney A., Worcester, Mass.
Reist, H. G., Schenectady, N. Y.
Rice, Calvin W., New York.
Richards, Francis H., New York.
Richards, Frank, New York.
Richardson, George P., Newark, N. J.
Richmond, George, New York.
Robb, A. G., Amherst, N. S., Canada.
Roberts, William, Waltham, Mass.
Robinson, A. W., Montreal, Canada.
Robinson, Edward, Burlington, Vt.
Rockwood, George I., Worcester, Mass.
Rogers, Winfield S., Bantam, Conn.
Rohrer, Albert L., Schenectady, N. Y.
Rowland, Charles B., member local Reception Committee, New York.
Rowland, George, New York.
Rowland, Thomas F., New York.
Rowland, Thomas F., Jr., Brooklyn, N. Y.
Ruckes, Joseph J., Jr., New York.
Rushmore, David B., Pittsfield, Mass.
Sabin, Alvah H., Long Island City, N. Y.
Sando, Will J., New York.
Sangster, Andrew, Sherbrooke, Quebec, Canada.
Sanguinetti, Percy A., New York.
Sawyer, Harry, Muskegon, Mich.
Schaeffler, Joseph C., Somerville, Mass.
Scheffler, Frederick A., Glen Ridge, N. J.
Scheele, John M. B., New York.
Schnuck, Edward F., Brooklyn, N. Y.
Schoenborn, W. E., Washington.
Schutte, Louis, Philadelphia.
Scribner, Charles W., Plainfield, N. J.
Scrivenor, Arthur, Richmond, Va.
Sedgwick, E. H., Elizabeth, N. J.
Sergeant, Charles H., Westfield, N. J.
Sewall, M. W., Roselle, N. J.
Seymour, James A., Auburn, N. Y.
Shantz, Oliver S., New York.
Sharpe, Henry D., Providence, R. I.
Shepherd, William G., Franklin, Pa.
Shipley, Thomas, York, Pa.
Smith, Charles F., Brooklyn, N. Y.
Smith, Ephraim, Boston.
Smith, Harry E., Brooklyn, N. Y.
Smith, Jesse M., member local Reception Committee, New York.
Smith, J. W., Paterson, N. J.
Smith, Louis L., Elizabeth, N. J.
Smith, Oberlin, Bridgeton, N. J.
Snell, Henry I., Philadelphia.
Sornborger, Edwin C., Buffalo, N. Y.
Soule, Richard H., member local Reception Committee, New York.
Spangler, H. W., Philadelphia.
Sparrow, Ernest P., New York.
Sparrow, John P., New York.
Spies, Albert, member local Reception Committee, Jersey City Heights, N. J.
Stangland, B. F., New York.
Stevens, Alfred H., Brooklyn, N. Y.
Stiles, Norman C., Hartford, Conn.
Stillman, F. H., member local Reception Committee, Brooklyn, N. Y.
Sturgess, John, Troy, N. Y.
Stutz, Charles C., Pittsburgh.
Suplee, Henry H., member local Reception Committee, New York.
Swasey, Ambrose, president elect, 1903-04, Cleveland.
Sweet, John E., Syracuse, N. Y.
Swift, Willis C., East Orange, N. J.
Tabor, Harris, Elizabeth, N. J.
Taylor, Fred W., Philadelphia.
Taylor, Fred. W., Jr., St. Johnsbury, Vt.
Taylor, John T., New York.
Taylor, William M., Indianapolis.
Thomas, Edward G., Boston.
Thompson, Edward P., New York.
Thompson, Erwin W., New York.
Thompson, Hugh L., Waterbury, Conn.
Thomson, John, New York.
Thorpe, Robert H., Montclair, N. J.
Threlfall, William V., Biddeford, Maine.
Tibbals, George A., Brooklyn, N. Y.
Tompkins, Samuel D., Jersey City, N. J.
Torrance, Henry, Jr., Tenafly, N. J.
Torrance, Kenneth, Brooklyn, N. Y.
Torrey, Herbert G., Stirling, N. J.
Towne, Henry R., New York.
Townsend, David, Philadelphia.
Trautwein, Alfred P., Carbondale, Pa.
Tremaine, E. G., Hackensack, N. J.
Trowbridge, Amasa, New York.
Trump, Edward N., Syracuse, N. Y.
Turner, John, East Orange, N. J.
Tuttle, Willard S., Brooklyn, N. Y.
Uehling, Edward A., Passaic, N. J.
Upson, Maxwell M., Brooklyn, N. Y.
Van Derhoef, George N., member local Reception Committee, New York.
Varney, William W., Baltimore.
Viall, William A., Providence, R. I.
Victorin, Anthony, Watertown, Mass.
Viola, Bartholomew, Brooklyn, N. Y.
Waldron, Fred. A., Stamford, Conn.
Wallace, David A., Newark, N. J.
Walworth, Arthur C., Newton Centre, Mass.
Warner, Worcester, R., Cleveland.
Warren, B. H., Alberene, Va.
Waters, George H., Livingston, S. I., N. Y.
Watson, William, Boston.
Webb, John B., Hoboken, N. J.
Webber, Samuel S., Trenton, N. J.
Webster, Hosea, Montclair, N. J.
Webster, William R., Jr., Bridgeport, Conn.

Wellman, Samuel T., Cleveland.
Wheeler, F. Meriam, Montclair, N. J.
Whipple, Eugene B., Providence, R. I.
Whitehead, George E., Providence, R. I.
Wightman, D. A., Warren, R. I.
Wiley, William H., treasurer, New York.
Williams, Franklin, Belleville, N. J.
Williams, Thomas H., Jersey City, N. J.
Williston, Arthur L., member local Reception Committee, Brooklyn, N. Y.
Wilson, J. F., Worcester, Mass.
Winship, James G., New York.
Winther, Charles A. G., Indian Orchard, Mass.
Wood, Erwin E., Springfield, Vt.
Woodbury, C. J. H., Lynn, Mass.
Woolson, Ira H., member local Reception Committee, New York.
Woolson, Orosco C., Newark, N. J.
Woolson, William D., Springfield, Vt.
Wright, Ernest N., Newton Centre, Mass.
Wright, James K., New York.
Young, Walter D., Baltimore.

The Australian Report on Iron Bounties.

MELBOURNE, November 6, 1903.—The Royal Commission appointed to inquire into the bill relating to the payment of bonuses on iron manufacture in Australia have made their report. The report is unfortunately discounted by the fact that the commissioners were divided equally in opinion, and the report was only declared carried by the casting vote of the chairman. Following are some interesting extracts from it:

In our opinion it is desirable to encourage the local establishment of this industry. Encouragement is specially needed in the initial stage of the industry to secure the requisite capital. The existence of powerful rival vested interests elsewhere and the novelty of the enterprise, so far as Australia is concerned, induce some hesitation in investing on the part of capitalists. Your commissioners are of opinion that the necessary encouragement can best be supplied in the form of a bonus on the manufacture of iron and steel from Australian ores. Your commissioners draw attention to the fact that the bonus system of Canada has immensely stimulated iron and steel production in the Dominion, and your commissioners are sanguine that the course now proposed will be productive of good results in Australia. Your commissioners do not lose sight of the fact that the bonus system in Canada was accompanied by a duty on imports. Your commissioners, however, do not recommend the immediate imposition of a customs duty, as, pending a local supply sufficient for Australian requirements, the result might be to temporarily raise the price to the consumer, which should be avoided.

Your commissioners believe that the proposed bonus on spelter would substantially encourage the utilization of quantities of zinciferous ores at Broken Hill. It is estimated that there are now raised on the surface and available for treatment about 3,500,000 tons of this material.

It has been clearly demonstrated that in connection with reapers and binders, which are not locally manufactured, but are chiefly imported from America and Canada, the Australian consumer has been compelled to pay the most exorbitant prices. Machines worth £15 or £16 at the port of export have frequently not been procurable at less than £55 or £60 by the producer in Australia, though duty free. These prices were substantially reduced a little before the introduction of the federal tariff, but have since been raised, though not to the former level.

Your commissioners recommend that provisions should be inserted in the bill, *a*, securing the equitable settlement by conciliation or arbitration of all industrial disputes in relation to any work for the earning of bonuses, and, *b*, securing to the Commonwealth or the State in which the work for the earning of bonus is being chiefly carried on, a right of purchase of the undertaking after a fair interval at a valuation.

The minority report submitted vigorously combats the proposition, and is in part as follows:

The bill provides for the payment of £324,000 of the people's money to private individuals engaged in an enterprise for their private gain. There can be no guarantee that the bonuses proposed would permanently establish the industry, though it is probable the inducements offered might be instrumental in forming speculative companies. One of the witnesses, Mr. Sandford, managing director of the Eskbank Iron Works, New South Wales, stated that he had made an agreement with an English syndicate to spend £250,000 in extending the Lithgow works if the bill passed. In answer to another question, Mr. Sandford said that to make pig iron he wanted a plant involving an expenditure of from £100,000 to £125,000. This estimate is less than half the sum proposed to be paid in bonuses. The Canadian experience is not encouraging. The bonus system for iron production was first instituted there in 1883. Subsequently a bill was passed in 1897 further continuing the system. Another bill was carried in 1899 providing for the diminution of the bounties by a sliding scale, expiring in 1907. In July of this year the Dominion Government decided to postpone the operation of this sliding scale for one year, which practically means a further increase in the bounties paid. Nearly all the witnesses examined before the commission agreed that the payment of bonuses would be useless unless followed by a duty. Experience shows that if the payment of bonuses be commenced the liability of the Commonwealth will not be limited to the sum proposed under the bill, but that further Government aid will be sought. The evidence failed to show that there was any commercial necessity for the bonuses proposed. Mr. Sandford said he could produce pig iron at Lithgow under 35 shillings a ton. Allowing for freight to Sydney, Melbourne and other parts of the Commonwealth, he could, on this showing, compete favorably with any imported pig iron. Other witnesses, who, however, had less experience than Mr. Sandford, doubted the correctness of his estimate of cost. But, on the supposition of his having made an under estimate, he would still, even without a bonus, be in an excellent position as compared with the imported commodity.

The report gives the following figures of iron and steel imports into the Australian commonwealth in 1902:

Commodities.	Tons.	Value.
Pig iron	28,029	£98,373
Bar and rod	38,282	334,636
Plate and sheet	22,627	178,548
Scrap	10,408	32,907
Galvanized iron	44,538	739,596
Rails	....	391,822
Wire (plain)	....	369,383
Wire (barb)	....	71,426
Wire netting	....	135,169
Pipes	....	298,183
Machinery	....	2,022,515

The following table gives the annual average of iron and steel imports for the five years ending December 31, 1902:

Commodities.	Tons.	Value.
Pig iron	32,046	£107,000
Bar and rod	59,849	525,965
Plate and sheet	....	151,947
Scrap	8,431	30,130
Galvanized iron	45,295	773,666
Rails	....	401,675
Wire (plain)	....	312,755
Wire (barb)	....	60,449
Wirenetting	....	70,610
Pipes	....	304,935
Machinery	....	1,764,044

The average annual value of the iron and steel imports is thus about £4,000,000.

Opportunity for American Bids on Electric Equipment.

The Tramway Board, Christchurch, New Zealand, are calling for tenders for the complete installation of an electric tramway system in their city. Tenders are returnable March 17, 1904. Specifications and schedules may be obtained on payment of a fee of £3 for section, or £25 for the complete set, from the office of the Agent General for New Zealand, in London. The sections are as follows: A. Power house equipment, steam plant. B. Power house equipment, electrical plant. C. Steel stack. D. Traveling crane. E. Cooling tower. F. Car bodies. G. Car trucks. H. Car motors. I. Compressed air brakes. J. Equipment of cars and sundry supplies. K. Repair shop tools. L. 1. Rails, fish plates, fish bolts and special work. L. 2. Permanent way. M. Overhead construction. N. Emergency wagon. O. Destination boxes, tablets and staff boxes. P. Life guards.

Closing of a Sheet Mill.

W. Sandford of Lithgow, N. S. W., has been compelled to close down his sheet mill, owing to dearth of wrought scrap and the reduction of duty from 40 to 15 shillings a ton. The blast furnace ordered in anticipation of the bonus bill referred to in another part of this letter, and awaiting shipment in England, is under offers for sale, pending the imposition of either a bonus or duty.

Paper Insulation for Wire and Cables.—The American Steel & Wire Company have made extensive tests with paper insulated wire and cables with results that are considered very important as demonstrating that for many purposes this insulation is a satisfactory substitute for rubber and other expensive insulating materials. As a consequence of these tests this paper insulation has been adopted for the New York underground system, and large amounts of the cable have already been delivered. The copper wire is wound with very strong paper, exactly like the paper wound lead pencil, to sharpen which a section of the paper is unwound from the point. After winding the paper on the wire it is dried as perfectly as

possible and then saturated in an insulating preparation. Finally it is covered with lead by the usual process. It is not supposed that paper insulation will stand continued exposure to the elements, but for such uses as that of the underground system it is believed to be as good as rubber insulation and is vastly cheaper.

Philadelphia Foundrymen's Association.

The one hundred and thirty-third regular monthly meeting of the Philadelphia Foundrymen's Association was held Wednesday evening, December 2, at the Manufacturers' Club in that city. Thomas Devlin, the president, called the meeting to order at the usual hour. Among those present were the following:

Thos. Devlin, Thos. Devlin Mfg. Company, Philadelphia, Pa.
E. E. Brown, E. E. Brown & Co., Philadelphia, Pa.
R. C. Oliphant, Oliphant Steel & Iron Company, Trenton, N. J.
P. D. Wanner, Reading Foundry Company, Reading, Pa.
J. Thompson, J. Thompson & Co., Philadelphia, Pa.
Geo. Johnston, Ernest Law & Co., Philadelphia, Pa.
A. C. Groome and L. S. Roberts, Bethlehem Steel Company, Philadelphia, Pa.
Andrew McClay and Wm. F. Bernstein, Bernstein Mfg. Company, Philadelphia, Pa.
Jno. R. Lawrence, Jerome Keeley & Co., Philadelphia, Pa.
Nicholas Mager, Logan Mfg. Company, Phœnixville, Pa.
N, Lillienberg, Carl Setterall & Co., Stockholm.
T. B. Harkins, Harkins Foundry Company, Bristol, Pa.
W. A. Perrine, Abram Cox Stove Company, Philadelphia, Pa.
J. S. Hibbs, J. W. Paxson Company, Philadelphia, Pa.
C. D. Matthews, Camden Iron Works, Camden, N. J.
H. L. Haldeman, Pulaski Iron Company, Philadelphia, Pa.
Geo. C. Davis, official chemist, Philadelphia, Pa.
A. A. Miller, *The Iron Age*, Philadelphia, Pa.
C. R. Brown, Jr., E. E. Brown & Co., Philadelphia, Pa.
A. D. Wallace, E. E. Brown & Co., Philadelphia, Pa.
W. H. Shelmire, Jr., Creswell & Waters Company, Philadelphia.
W. J. W. Moore, Pilling & Crane, Philadelphia, Pa.
F. C. Pullman, J. Wesley Pullman, Philadelphia, Pa.
K. Sylvester, J. Wesley Pullman, Philadelphia, Pa.
H. C. Matlack, Frank Samuel, Philadelphia, Pa.
Edward Hitzeroth, C. Hitzeroth Foundry, Philadelphia, Pa.
Geo. M. Benkert, G. Rebmann & Co., Philadelphia, Pa.
J. J. McCrystal, Girard Iron Works, Philadelphia, Pa.
T. J. Kelley, Thomas-Roberts-Stevenson Company, Philadelphia.
H. O. Evans, Thomas Devlin Mfg. Company, Philadelphia, Pa.
W. O. Steele, Bateman Mfg. Company, Grenloch, N. J.
F. Von A. Cabeen, Cabeen & Co., Philadelphia, Pa.
Wm. S. Hallowell, Harrison Safety Boiler Works, Philadelphia.
S. G. Flagg, Jr., Stanley G. Flagg & Co., Philadelphia, Pa.
J. S. Robeson, American Glutrose Company, Camden, N. J.
F. C. Price, E. J. Etting, Philadelphia, Pa.
H. W. Coleman, J. K. Dimmick & Co., Philadelphia, Pa.
Thos. Holt, Camden Foundry Company, Camden, N. J.
Herbert Holt, Camden Foundry Company, Camden, N. J.
W. E. Mack, J. Thompson & Co., Philadelphia, Pa.
Harry Huder, Schaum & Uhlinger, Philadelphia, Pa.
A. McKowan, Williamson Bros. & Co., Philadelphia, Pa.
Geo. H. Jefferis, Pusey & Jones Company, Wilmington, Del.
J. Parker Jefferis, Pusey & Jones Company, Wilmington, Del.
A. Falkenau, Falkenau & Sinclair Mch. Company, Philadelphia.
F. E. Dodge, Barrett Mfg. Company, Philadelphia, Pa.
F. J. Wright, U. S. Cast Iron Pipe & Foundry Company, Burlington, N. J.
Wm. Wisner, R. S. Newbold & Son Company, Norristown, Pa.
Percy N. Shoeberger, B. F. Sturtevant Company, Philadelphia.
Jno. Patton, North Wales Foundry Company, North Wales, Pa.
W. A. Heizmann, Penn Hardware Company, Reading, Pa.
Howard Evans, J. W. Paxson Company, Philadelphia, Pa.

The regular business of the association was transacted as usual. The treasurer reported a balance of $1900 on hand, with all bills paid. The Committee on the St. Louis Model Foundry Exhibit, Dr. E. E. Brown, chairman, submitted the following report:

At a conference with members of the National Founders', the American Foundrymen's and the Philadelphia Foundrymen's associations, held at the Manufacturers' Club, Philadelphia, November 27, it was decided to submit to the foundrymen of the country, the general plan or means of arranging for a special foundrymen's building, within the exposition grounds at the World's Fair to be held at St. Louis from May until December, 1904. It is to serve as a headquarters for foundrymen and as a place for exhibiting every class of modern foundry equipment and products.

The great exhibition buildings are already overcrowded to the extent that it is impossible to obtain floor space for any collection of foundry exhibits, particularly for a "working foundry." The cement manufacturers and several other organizations are providing special headquarters, and the foundrymen are invited to do likewise. Exhibitors and assistants will be admitted to the grounds and building free.

The proposed building is to contain special rooms which will serve as a headquarters for foundrymen, with convenience for writing, consultation, &c., and which will contain all the foundry literature. The larger part of the floor space in the building will be devoted to an exhibit of foundry equipment and products, a portion of which equipment will be operating in such a way as to show to the public something of the methods of foundry work.

In conection with the foundry operations, castings will be made in iron, steel, brass, bronze, &c., some of which castings will be of such size and character as can be sold to visitors and the proceeds of such sales will go toward the expenses of the foundry. As a means of raising funds sufficient for the erection of the proposed foundry building, it is proposed that a charge of $1.50 per square foot of covered floor space, and $1 per square foot for adjacent space outside to be made to exhibitors, and that no allotment of space for this purpose be made for less than $50. The amount so paid for floor space in this building will be considered as a subscription toward the cost of the building, &c. Where exhibits are to be operated it will be done at the expense of the exhibitor. All subscriptions must be in by January 1, 1904.

From persons interested in the advancement of the foundry industry, but who may not care to make exhibits, contributions to the cost of the building and the maintenance of the foundrymen's headquarters will be most welcome. Subscribers for space under this arrangement should promptly notify the secretary of their local foundrymen's association. But no payment of such subscription will be required until each prospective exhibitor is notified that a sufficient fund has been subscribed ($10,000 or more) to guarantee the construction of the building, and hence the success of this undertaking, and the payment should then be made to the same.

The foundry building will be constructed and the exhibits of equipments will be arranged under a special committee of foundrymen to be appointed as follows: One each from the National Founders' Association, the American Foundrymen's Association, the Philadelphia Foundrymen's Association, the New England Foundrymen's Association, Foundrymen's Association at Pittsburgh, St. Louis, &c.

This is the first time in the history of the great exhibitions in this or any other country that the foundry interest has been specially recognized. It is believed that a foundrymen's association headquarters and an exhibit of foundry equipment practice and products such as is now proposed will arouse a new interest in the foundry industry of the United States and will help the people of this country to appreciate the importance and nature of this great industry.

Plans prepared by Dr. Edmund A. Engler, president of the Worcester Polytechnic Institute, showing a foundry building, particularly arranged for just such a working exhibit, were shown, and after general discussion it was moved that the committee's report be received and they instructed to take the entire matter up with the general committee and decide upon the plan best suited for the purposes, &c. This motion was unanimously passed.

In view of the proposed appointment of commissioners by the United States Government for the construction of the Panama Canal, the association by resolution recommended the appointment of John Birkinbine of Philadelphia, as one of the said commissioners.

The Quiz Class.

The quiz class, a new feature of the association meeting, whereby questions pertaining to the general foundry trade may be asked, which at the next meeting will be answered and discussed, announced for the evening discussion the following subject: "What is meant by 72-hour coke, and how can it be distinguished from other grades?"

Considerable discussion followed. The actual distinction between 72 and 48 hour coke, it was claimed by almost all the speakers, could not be made by observation. Many had used 48-hour coke with as good results as obtained with 72-hour coke. The grade or term, 72-hour coke, was said to be a misnomer, it being rather the care in selection and cleansing the coke at the ovens that made the grade. Freedom from burnt ends, nigger heads, jammed pieces and coke of a good gray color, are the particular features of the generally termed 72-hour coke, and which is prepared by careful selection and hand picking. Seventy-two-hour coke itself was said to be produced only by the custom of running the ovens over Sunday, instead of drawing on that day, the ovens being regulated to burn slower, so that by an excess of air the fixed carbon would not be burned when coking was completed. Chemically, it was contended that coal properly burned, that is to complete coking, whether regulated for 48 or 72 hours' burning, would show no appreciable difference on analysis. "By-product" coke, it was said, which is burned even less than 48 hours and which has everything against it as far as appearance goes, was

used with success equal to that when 72-hour coke was used. The usually termed 48-hour coke is largely used by furnaces, while the 72-hour coke is, by reason of its better preparation, used for foundry purposes. It was maintained that it would be far better to distinguish between the two by the terms furnace and foundry coke than the hour term, as is the custom in this vicinity.

Another subject proposed was "What are the advantages of loam or dry sand castings over green sand for certain classes of work?" This was explained in the fact that in large and heavy work the body of fluid metal would not "lay" on a green sand surface of a mold, due to the moisture in the sand, &c., while against the dry or loam mold it would "lay" quietly and make a good, sound and clean casting.

The paper of the evening, entitled "Some troubles with samples of iron and coke," was read by Geo. C. Davis, official chemist of the association. Mr. Davis also exhibited a number of faulty mail packages just as they had been received by him and which, from contamination of the material for analyses, would have given erroneous results.

H. L. Haldeman of the Pulaski Iron Company said in discussion that foundrymen do not appreciate sufficiently the value of careful sampling. Sulphur and silicon are the chief elements with which the foundryman usually has to contend, and when it is considered that the chemical contents of these elements in pig iron vary in different parts of the same cast of metal from the blast furnace, it is quite necessary a good average sample be taken for analysis to represent the particular lot of iron under examination.

A vote of thanks was tendered Mr. Davis for his excellent paper.

The following subjects were then announced as being proposed to the quiz class, to be discussed at the January meeting of the association:

How many degrees Fahrenheit should an annealing oven be to properly anneal, and how long should material be placed therein?

Does it require more air and greater pressure of blower to melt high numbers of cast iron in a cupola for malleable purposes than it does for ordinary gray iron?

Does it take longer to melt hard white iron for malleable purposes than it does for soft gray iron in a cupola of the same internal diameter?

What causes the change of carbon monoxide gas at the melting point in a cupola to carbon dioxide, above said melting point?

Does high silica facing resist the action of hot steel in steel casting to a greater extent than a high carbon facing?

Relative life of brass, galvanized and steel riddles.

Amount of moisture in sand when properly tempered for use.

Relative advantages of exhaust and nonexhaust tumbling barrels for different classes of work.

Are steel castings made by any of the baby Bessemer processes better for certain purposes than those made by the crucible or open hearth processes?

The meeting then adjourned, and the usual lunch was served on the roof garden of the club.

American Goods in Australia.—A special correspondent in Melbourne, writing under date of November 5, says: "Our trade in shafting and power transmission seems to be well in the hands of your people, and the polished American shafting and fittings are extensively used. Wood split pulleys are quite an institution here, and a great many factories prefer them as they are light, strong, cheap and easily fitted, while the gripping power is right. Semirotary pumps of German make have ready buyers, and nearly every house stocks them. They are cheap, effective and lasting, and for a force and lift pump where a moderate quantity of water has to be raised are excellent. The American lift pump is established well, but being only useful for one class of work is often passed over. The semirotary is so convenient to fix that it appeals to buyers, and more especially to men possessing few appliances. If American prices and quality compare with those already sold here you should pick up a decent trade. Turning machines are being introduced here largely, and the repeat orders of merchants speak well. The lathes for engineers have in many cases a good hold of users, and great satisfaction is given."

An Electric Railway on Steam Railway Principles.

The Columbus, Greensburg & Richmond Traction Company, Indianapolis, Ind., have incorporated, with a capital stock of $1,000,000. The officers of the company are Amos K. Hallowell, president; Harris F. Holland, vice-president; Milton O. Reeves, treasurer; Charles N. Wilson, secretary and general manager; Thomas E. Davidson, general counsel. The officers, together with August M. Kuhn, Indianapolis; William P. Myer, Indianapolis, and Walter McConaha, Richmond, constitute the Board of Directors. The company purpose building a road from Columbus, Ind., through Greensburg and Connersville to Richmond, 100 miles, double track, with stone ballast. It will be equipped for freight, passenger, mail, baggage and express service. An electric engine is being provided capable of hauling 20 loaded cars *en train*. A $450,000 power house will be built at Greensburg, from which point it is intended to build a line by the way of North Vernon and Louisville. Branches will be built from Connersville to Milton, connecting the entire Indiana gas belt with this system. A line from New Salem to Rushville will connect with French Lick and West Baden, giving a through Holland sleeping car service from those points, connecting with the Appleyard system in Ohio, delivering passengers to Columbus, Cleveland, Buffalo, Toledo, Detroit and Port Huron. It is expected that by the time this road is ready for operation continuous through service will be provided into Pittsburgh. Its officers state that this roads owns its own private right of way, 60 feet wide, in fee simple, avoids all highways except in crossing and will be built according to the specifications of steam roads, with 1½ per cent. grades and 3 per cent. and less curves. Great care has been exercised in the selection of the route with regard to grades and curves, and it is expected that a speed of 50 miles an hour may be maintained on all curves with reasonable safety. It is expected that engineers will be on the field within 30 days, that contracts will be let early in the coming year, and active work begun in the way of construction at both Greensburg and Columbus as soon as the frost is out of the ground.

North Tonawanda's Importance

At the annual banquet of the Board of Trade of North Tonawanda, N. Y., held December 2, addresses were made by many prominent speakers indorsing the project of a ship canal around the upper rapids of the Niagara River between Buffalo and Tonawanda, and pointing out its necessity for the industrial development of the Niagara frontier. Detailed surveys, plans and estimates have been prepared by Col. Thomas W. Symonds and Major Theodore A. Bingham of the Corps of United States Engineers, and will be submitted to Congress during the session now opening, and the authorization of the prompt construction of the ship canal, with necessary locks and basins, by the Government will be urged. Harvey D. Goulder of Cleveland and W. Carl Ely, president of the International Railway Company of Buffalo, were among the principal speakers.

Apropos of the above, it may be stated that the annual report of the North Tonawanda Board of Trade gives the information that more than 2000 vessels arrived and cleared from that port during the season. All told, 450,000,000 feet of lumber stock and 275,000 tons of iron ore were received there. The number of canal boats that arrived and cleared over the Erie Canal was 3400, while the total amount shipped by canal was 160,000,000 feet of lumber and 6000 tons of pig iron. By rail 33,000 loaded cars were shipped and 17,000 loaded cars received.

At Pittsburgh the courts have handed down a decision in the case of Gordon, Strobel & Laureau *et al.* against the Best Mfg. Company and the Carnegie Steel Company. The suit was brought alleging that the defendant companies infringed on a patent granted the plaintiffs for the preservation of the lining of blast furnaces. The court orders a decree to be drawn dismissing the bill for non-infringement.

The Iron Age

New York, Thursday, December 10, 1903.

DAVID WILLIAMS COMPANY, - - - - - - - - PUBLISHERS.
CHARLES KIRCHHOFF, - - - - - - - - - EDITOR.
GEO. W. COPE, - - - - - - - - - - ASSOCIATE EDITOR.
RICHARD R. WILLIAMS, - - - - - - - - - HARDWARE EDITOR.
JOHN S. KING, - - - - - - - - - - BUSINESS MANAGER.

The Possibilities of Export Trade and the Efficiency of Labor.

The most important chapters in the history of international steel trade currents may be written in the next two or three years. It is necessary to scratch far below the surface to obtain any true insight. Events that have occurred have been confusing rather than indicative, and the present currents of trade are so opposing and produce so many eddies that they themselves constitute no evidence of value in seeking light on the future. When England was at the zenith of her prosperity the foundation was laid, in the complacency engendered in masters and men, for her defeat; when, a dozen or fifteen years ago, the cost of labor per ton was so high in the United States as to stifle the thought of our entering the world's markets, the foundation was laid, through various economies, for our entering that trade a few years later; our prosperity in the past few years has brought about, through extensions to capacity, the urgent need that we should carry on a large export trade, while it has concurrently pushed to if not absolutely closed the door to that trade by advancing the cost of manufacture. In these striking events there is little guide to the future. Nor do present trade currents throw much light on the subject. We all know that the German iron and steel industry has made wonderful strides in export business of late. The increase in Germany's iron and steel exports in 1902 compared with 1901 was astonishing, especially since it involved so steady going a race. Yet in that same year England exported more than a million tons of pig iron, and Germany was, next to the United States, her best customer. England, who has had an irruption of American steel within a few weeks, sent us in 1902 nearly half the pig iron she exported. With our magnificent raw materials on the one hand, and our high priced labor on the other, we fall behind Germany in exports of the cruder materials, such as pig iron, rails and shapes, yet we exceed her in exports of such a finished line as wire. For purposes of forecasting international trade movements in iron and steel the statistics prove both everything and nothing.

It is not preferable, then, but necessary, that fundamental conditions, rather than current developments, should be studied. Our position as to resources which nature has placed in the ground is good, but not invincible. It can well be debated whether Germany has not superior natural advantages. Her calcareous Minette ores, although low in grade, are cheaply mined, and the very fact of their phosphorus content being so high makes them an important competitor of our low phosphorus ores, in that they can be, and are, used with a pneumatic process, furnishing as a by-product a fertilizer which the country demands. Our world famed coke, when measured by the standard of our present enormous demands, is a matter of a very few decades, and must give place more or less to other coke, plentiful enough, but not so good.

Beyond what nature has placed in the ground cost of production depends totally upon labor, its economy depending partly on the way it is applied and partly upon how much is actually paid out for it in cash. American engineers and managers have done wonders in making labor effective, but they have not and cannot replace labor. A ton of steel is still made by labor, and always will be. Men may be displaced in the steel mill by automatic tables, but it takes men to make the table. The improved boiler and engine may require less coal, but coal must still be mined, and in increasing quantities. There is no reason to believe that our engineers and managers have relaxed or will relax their efforts to make labor effective, but that labor is still needed and always will be. What it costs involves the problem yet to be considered; the application of the labor is in good hands.

We study the increasing economy of our machinery and congratulate ourselves on the result. We make a machine which produces twice as much as the same class of machine did ten years ago or five years ago; then we get into the meshes and say that the efficiency of labor has been doubled. Has the human mechanism, *per se*, been doubled in efficiency? May it not have been that the efficiency of the metallic machinery was really increased three times, but the human machine relaxed its vigilance a little, making the net increase of the combination only twofold? If our improvements in our machinery are met by a decrease in the efficiency of the human machine, considered apart, we are a gainer by less than we think.

There is a continual debate as to the reward labor is getting now as compared with former years. One wonders why it is never settled. One side shows how wages have advanced and the other how the cost of living has increased. If the progress in economies of manufacture has been so great, how is there room for debate on this question?

There has been no greater barrier to our arrival at the truth in this matter than the ponderous mass of statistics, gathered by both public and private effort. Disraeli said there were three forms of inveracity—lies, damned lies and statistics. His *bon mot* should not be taken literally. Statistics themselves do not lie, but there is such a glory about them to the average mind that the effulgence blinds the eye to truths in the background which otherwise painstaking effort would have discovered. It is easy to collect from the books of manufacturing companies figures showing the dollars and cents which have been paid to so many employees at such and such times. simple process of division gives the daily wage rate, and there you are! Where are the statistics of efficiency, showing what was received in actual human effort, for these dollars and cents? The accounts of manufacturing companies have no such data accessible to the statisticians. Sometimes there are records—too deep, however, to be available for the statisticians—of production per man or per crew, but where is the effort to separate the increases thus shown into increases legitimately due to the improved mechanical facilities and increases due to increased efficiency of the human mechanism itself? Would it not generally develop that the latter was a minus quantity, only hidden because the algebraic sum of the two is plus?

Practical men well know that too often this human efficiency has decreased. They can cite cases, if not statistics. Then there is no surprise if the cost of living has advanced as much as wages, or even more. Where efficiency decreases the cost of production increases. Society as a body cannot complain if it creates less, when it is working less, nor can the individual complain if the increased number of dollars he receives will buy less.

when he himself has contributed less to the total production.

Every period of industrial depression furnishes the lesson that a period of prosperity has insidiously brought about extravagances which must be corrected. Cost of production decreases in much greater ratio than daily wage rates. One man is found who can do work which, it was thought, required two. Our lowest selling prices are always found near the end, and not near the middle or beginning of a depression.

This is the serious problem which confronts the American iron trade, if it desires to take a permanent place as a heavy exporter of its products, from pig iron to intricate machinery. There is a long campaign ahead. The reductions in daily wage rates now going on are but an incident, the taking of a little outpost, in the march to capture a large share of the world's markets. The main strength for the march must come from first restoring and then increasing the efficiency of the human machine.

Manufacturers' Conservatism Not Appreciated.

A recent editorial in the *Journal of Commerce* of this city, entitled "Industrial Reactions and Combinations," presents an illustration of deplorably indiscriminate condemnation. The writer of the article charges the combinations of capital and labor with the responsibility for arresting the prosperity which, but for their abuses and excesses, he thinks might have been long continued. He states that "the main cause of reaction at the present time is inordinately high prices, which have put a severe check upon the demand for products, and now it is supply and the capacity for supply that are in excess." Throughout the article manufacturers are charged with greed, and labor is critcised for excessive demands. It is an illustration of the loose writing indulged in by those who either have only a partial knowledge of the facts or are not broad enough to give some measure of credit to those entitled to it for their conservatism at a time when it would have been more profitable for them to have yielded to the influences around them. It is a very easy matter for writers on the daily press to indulge in indiscriminate criticism. It sometimes suits their purposes to conceal facts if, as in this case, they appear to be animated by hostility to manufacturing interests. The writer of the article alluded to apparently belongs to that class of thinkers who are implacably hostile to any measures adopted by manufacturers for the protection of their interests. He sees no virtues among those to whom he is opposed.

Speaking for the iron and steel industry, the statement is not true that "the mechanism of industry and trade was put out of adjustment by the greed of capital and labor in industries that were organized and by their abuse of the power of combination." The most striking fact of the period of excited demand through which we have just passed is the manner in which the great producers of iron and steel persistently endeavored to prevent "inordinately high prices." The large independent producers joined with the management of the United States Steel Corporation in endeavoring to keep prices on a reasonable level. In this policy they were further joined by the large Southern producers of pig iron, who stubbornly contested the advance in pig iron prices until they were overwhelmed by the rising tide of the demand from consumers. The pig iron producers were absolutely compelled to change their policy and permit their prices to be governed by the law of demand and supply. The large steel manufacturers were more steadfast in carrying out their policy, leaving to the smaller producers the exaction of premiums for prompt shipment. The charge of making exorbitant prices during the period of extraordinary demand, which surpassed anything ever known in history, cannot be laid at the doors of the large steel producers or any combination of them. The great bulk of the business was done at a rate very much under what might be termed "inordinately high prices."

So far from accepting the view of the situation as presented by the *Journal of Commerce*, many wise heads in the iron trade are inclining to the opinion that an error of judgment was made by the great producers in endeavoring to keep down prices. It is argued that profits have been foregone which might just as well have been reaped. There is no sentiment in trade, and the buyers of iron and steel give no favors to the large producers for their magnanimity. It must be admitted that the attempt to prevent prices from soaring was not inspired by sympathy for the buyer, but was due to the dread of a serious reaction, which in the past had always followed an era of very high prices. But it is manifest now that a reaction is inevitable after any time of great activity, even though prices may not be forced to a very high point. Buyers have for some time been purchasing as sparingly as possible, and have been using all the means at their command to force prices to a lower level. While they may not regard the rates on steel products as unreasonable, yet they are not disposed to pay them if they believe that by waiting they may be able to get concessions. It is undoubtedly disappointing to the large producers to und that their conservatism has not been appreciated by the trade, but it is most exasperating to find that those who should be safe leaders of opinion totally ignore the sacrifices of profits thus made.

The Currency Recommendations.

It was perhaps a part of the purpose to discourage financial legislation, which has been attributed to the Congressional leaders, that Mr. Hill of Connecticut, who had just introduced a bill to improve currency conditions, and who has for several years been a useful member of the committee, and Mr. Overstreet of Indiana, who was prominent in the effort at currency legislation which culminated in the act of March 14, 1900, were omitted by the Speaker in making up the committee of the House on Banking and Currency. Mr. Fowler of New Jersey, however, remains chairman, but few, if any, of the other members of the committee have been active in efforts to secure better financial legislation.

The report that Mr. Hill's bill expressed the views of the Administration receives some corroboration from the message of the President and the report of Secretary Shaw, but neither document presses the subject very strongly upon the attention of Congress. The President limits his recommendations to the suggestion that customs as well as internal revenue collections should be subject to the Secretary's authority to deposit funds in national banks. Secretary Shaw goes beyond this and recommends that gold certificates of the value of $10 be issued and that the national banks be permitted to issue a larger proportion of $5 bills. These changes are designed to meet the increasing demand for small notes, and both, together with the suggestion regarding the deposit of customs collections, appear in the Hill Currency bill. Large financial operations are effected increasingly by checks and drafts, and the need of more currency takes the form for the most part of an increased need of small bills for retail trading and the payment of wages, and very large bills used in settlements between banks.

The Secretary also expresses the opinion that the bank currency ought to be made elastic, but he refrains from proposing a method of accomplishing this. In the interest, however, of a larger circulation, he proposes that Panama Canal bonds be accepted as security for circulation—which would add materially to the bonds available for that purpose—and that the tax on circulation secured by those bonds or by the bonds hereafter issued be one-half of 1 per cent. per annum. He invites Congress to authorize him to buy silver bullion for the coinage of subsidiary silver, or to authorize him to recoin silver dollars into smaller pieces. He is apparently indifferent which measure is adopted. Mr. Hill's bill proposes the recoinage of silver dollars.

The Comptroller of the Currency is more specific in his recommendations, but he refers to and repeats his recommendations of last year, as though he felt obliged to advise Congress, but expected no present result from it. The bank circulation reached its maximum point last September, and the increase during the 12 months ending October 31 was well over 10 per cent. But nearly the whole of this increase was due to the resumption of the refunding operations authorized by the act of March 14, 1900, and the substitution for other bonds of the 2 per cents, notes secured by which are taxed only ½ per cent. The increase of circulation was due to no disposition of the system to adapt itself to an increased demand for currency, but to legislation. Nearly all of the increase occurred in the spring and early summer, when there is little or no need of additional currency, but when the Secretary saw fit to resume refunding.

The maximum need of currency occurs late in the fall. But the increase stopped in September and began again in a small way in October, following a resumption of refunding. But even while this increase of the circulation was going on contraction was also in progress. The price of bonds had advanced to a point at which many banks found it profitable to retire their circulation at the season of the year when business requires the largest volume of money. In the latter part of September applications for the retirement of circulation were made up to the statutory maximum of $3,000,000 a month for the months of September, October, November and December. As Mr. Ridgely say, "this still further emphasizes the one serious defect in the system—that the variation in the volume of currency, instead of responding to the demand for currency, depends on the market price of bonds." To remedy this the Comptroller renews his recommendation that banks be allowed to issue some amount of notes without bond security; so far as it goes this is the asset currency plan. The country got through the past autumn without a serious stringency, largely because the stock liquidation in New York diminished the need of money in the East, and the requirements of the West were proportionately more easily supplied. We have had some monetary stringency—several times a serious one—nearly every autumn for a dozen years or more, and this year is the third in succession when banks have been retiring $3,000,000 a month—all the law allows—at the very time that the need of currency was greatest and the Treasury was making exceptional efforts to increase the supply of money. There is no remedy for this situation so long as all bank currency is secured by Government bonds.

Inventory taking is at present an important factor in the iron and steel business and in business in general, and when this is ended, with the new year there promises to be a good deal of buying which should have a marked effect for the better upon the general situation. The rapid fall in pig iron caught nearly every manufacturer with a considerable supply of raw material on hand, and prices of other materials followed quickly in the downward tendency. So did the price of many lines of manufactured products. The result is that large sums of money are being charged off for depreciation. Buying has been scant and stocks are very low, not only of raw materials but in some lines of manufactured product. The desire to make the best possible showing in the present year's business is felt in the buying. Stocks must be replenished before long. Many observers predict that this necessary buying, coupled with the effect of the excellent manner in which the railroads are getting the Western crops to market, will have a very marked result in bettering business conditions early in 1904.

The Corporation Profit Sharing Plan.

In all the talk about the stock that the United States Steel Corporation sold their employees at $82.50 a share, it seems to have been generally forgotten, or never comprehended, that in January the first of the extra dividends of $5 a share will be paid on all stock issued under the profit sharing plan. Under the contract between the corporation and their employees, who bought the stock, it was agreed that they receive the regular dividends of 7 per cent., and in addition they shall receive $5 a share extra dividend each January for five years, making an annual total, as long as the preferred share earns its dividends, of $12 a share, which is 14.50 per cent. on the investment of $82.50. Another feature is lost sight of, that the corporation under the contract must take back the stock at the end of the five years, paying $82.50 for it, if the employee wishes to sell at that time. The same man must have held the stock during the five years, of course. He cannot sell this right. In other words, under this profit sharing plan, the employee bought for $82.50 a share stock guaranteed to be worth as much at the end of five years and earning $12 a share. If before the end of the five years the preferred stock dividend should be reduced, or even were it to be passed, which it is hardly worth while to suppose, the stock held by employees would still, under their contract, earn $5 a year special dividend, which is more than 6 per cent. on the money invested. The trouble with this profit sharing plan is that it is so intricate that most employees do not understand it. In fact, officials of the company have been heard to say that they do not entirely understand it themselves. In the complications the exceptional security and earning capacity of the investment are not realized. Employees have cashed in their stock who would not have done so had they understood that to hold it to January would mean another $5 dividend.

A new way of putting an old story is the statement made in a leaflet now being distributed by the Atlantic Carriers' Association that "we are paying, to build up the sea power of Europe, from $100,000,000 to $200,000,000 a year." The point is well taken. It is a severe arraignment of the national shipping policy to state that a country which furnishes more deep sea freight than any other country in the world pays year after year such an enormous amount toward building up foreign sea power. The present registered American ocean tonnage is only 879,000, which is sufficient to convey but 9.1 per cent. of our imports and exports. The remainder of our ocean commerce is carried by the ships and seamen of Great Britain, Germany, France, Norway, Italy, &c. In 1861 the American tonnage registered for foreign trade

was 2,496,000. Our foreign trade has grown to three and one-third times its volume in 1861, while our deep sea tonnage has shrunk to a little over one-third its size in that year. The most important business question now before the American people is how to regain our ancient standing in the ocean carrying trade.

A contemporary says that a very strong effort was made by the trade unions of Maryland to elect enough members to the Legislature of that State to secure the return of Louis E. McComas to the United States Senate. Mr. McComas is a warm advocate of the national eight-hour bill, and the labor leaders were very desirous of keeping him in the Senate to promote their interests. Their efforts failed ingloriously. Many who are in political accord with Senator McComas must feel gratification at the fact that the trade unions were unable to muster enough votes to make their power felt. Possibly other political leaders who are cultivating the favor of trade unions may take a lesson from Senator McComas' experience.

Canadian Manufacturing News.

Electrical Smelting of Iron.

TORONTO, December 5, 1903.—The Dominion Government is having the question of the electrical smelting of iron looked into. A commissioner is to be sent to Europe to visit and examine works in which this mode of reducing the metal from the ore is in use. He will be in the service of the Interior Department, to which belongs the division of mines, established within the last few years, Dr. Haanel being the superintendent. The creating of this division of the civil service and the placing of an expert mineralogist at the head of it were the first steps taken by the Dominion Government, outside the Geological Survey, to put itself in a position to furnish technical and statistical information to the mining interests of the country. Until quite lately, indeed, the time had not come for much Federal activity along this line. The older provinces have absolute control of all the land within their bounds except the Indian reserves. Hence the timber and minerals on the Crown lands of Nova Scotia, Prince Edward Island, New Brunswick, Quebec and British Columbia are, with the exception of the Indian lands, outside the Federal jurisdiction. Besides the Indian lands in these provinces there remains the immense tract of the Northwest Territories and the unoccupied lands of Manitoba. These are under the direct administration of the Dominion Government, and it was because the extension of Western railway mileage and the spread of settlement were bringing the mineral wealth of these areas into prominence that the division of mines was opened at Ottawa. Dr. Haanel's investigations and advice have been productive of good results, and now the Minister of the Interior seems disposed to make the division serviceable to the country at large—to the provinces that are independent in respect to Crown mineral areas as well as to those portions of the country where the Dominion governs.

There are two or three considerations turning the Government's interest to the matter of electrical smelting. In the first place, of Canada's many known iron deposits, few contain a high grade ore. If there is to be development in many localities, the cost of treating the ore must be low. In the second place, the ore that is most abundant in some regions contains undesirable ingredients that cannot be economically separated in the ordinary furnace. In the third place, the natural distribution of coal in Canada is by no means so scattered as is the occurrence of iron ore. The cost of laying down the coke, joined to the leanness or the refractory character of the ore, negatives the working of some of the largest deposits by the usual method. A fourth consideration is the great water power resources that are conveniently disposed all over the country. These conditions, taken into account, along with the country's comparatively backward and unsuccessful development of its iron resources, seem to justify the Government in endeavoring to facilitate the application of electricity to the work of iron smelting.

It is probable that the commissioner would visit Italy, where the Government has given considerable attention to the same question, its experiments having been carried on under the direction of Signor Stassano. Likely, too, the Keller process in operation at Livet in France will be examined, as also the Harmet process in use in the same country. At Sysinge, in Sweden, steel is made from pig iron and scrap by an electrical method. If the idea is found workable in this country there may follow a considerable industrial development from its adoption, for there are undoubtedly great stores of iron ore, and the occurrence of the deposits is usually in the neighborhood of a water power, for where there are iron or other ranges, there are usually sharp changes in the level of the nearest stream.

German Surtax Hits Britain.

An order-in-Council has just been passed at Ottawa which places the incidence of the German surtax directly on the German merchandise that has passed through a secondary manufacturing process in the United Kingdom. It is a very well-known fact that a large part of Britain's imports from Germany is made up of partially manufactured articles. When Britain re-exported the product in the finished state to Canada the Customs Department here had then the question to answer, "Shall the British preference apply?" A rule was adopted to guide collectors in such cases. It was this: If 25 per cent. of the value of the article was the contribution of British labor then it should be treated as wholly British and receive the benefit of the preferential duty, which is two-thirds of the regular duty. Last spring a retaliatory tariff was adopted as against German articles on the dutiable list. Under this German articles not on the free list are taxed four-thirds of the regular duty; that is just twice the duty on British goods.

The present order-in-Council deprives German goods of the benefit of the preference that had formerly been give to such of them as underwent nominal treatment in Great Britain. And care is to be taken in respect to articles of German origin that have passed through a process in any other country. On this point the order runs as follows:

> Such surtax shall also apply to any article imported into Canada when the chief values of the article was produced in Germany, although it may have been improved or advanced in value by the labor of another country; notwithstanding the provisions of the British preferential tariff and regulations thereunder. In determining whether or not any article imported into Canada, which has been produced, improved or advanced in value by the labor of any country other than Germany, is subject to the surtax by reason of a portion of the value thereof having been produced in Germany, the fair market value of the article or material grown or produced or manufactured in Germany, which has entered into the manufacture of the article imported into Canada, shall be held to be the value produced in Germany, within the meaning of the tariff act respecting the surtax.

Rebate of Duty.

It is provided in the Canadian tariff law that the Canadian manufacturer may recover from the Government 99 per cent. of the duty he has paid upon the imported material contained in any article he exports. This provision has proved highly beneficial to manufacturers who sell a large part of their output in outside markets. Canada's export trade in manufactured goods is one of considerable proportions. During the last three years its progress has been checked somewhat by the difficulty of finding goods to keep on increasing it, for though the production of Canadian manufactories had greatly expanded, the home demand had likewise increased. Its saturating point had been raised many degrees by prosperity. In that period of maximum demand and large profits the question of the rebate referred to above was not one of much concern either to producers of finished goods or to producers of either raw or intermediate grades of material. It has of late been raised, however, and especially in relation to pig iron and steel. Robert Hobson, secretary and assistant manager of the Hamilton Steel & Iron Company, had something to say about it a short time ago. It was to this effect:

> Another discouragement the company had to deal with was

the fact that manufacturers of agricultural implements, &c., intended for export, were granted a rebate of duty paid on raw material, such as iron and steel. Consequently, firms like the Massey-Harris Company, the Deering Harvesting Machinery Company, &c., naturally bought their raw material for their export trade from United States firms, thus shutting the Canadian iron and steel manufacturers out of a large part of the home market.

J. Kerr Osborne, vice-president of the Massey-Harris Company, said, in reference to this, that the question was wholly one of price. If the Canadian price had to be paid for raw material, the finished product would cost too much to be salable at a profit in the foreign market. Mr. Osborne said that the importation of raw material was increasing because the exportation of finished product was growing.

Customs Appraisement.

That long standing grievance of importers, differing appraisements for duty at different customs ports, was the subject of a resolution at the last weekly meeting of the Montreal Board of Trade Council. The resolution, which was passed unanimously, was as follows:

That the present lack of uniformity in the application of the provisions of the customs tariff at the various ports of entry in Canada is a source of great disadvantage to importers. The council, therefore, asks the Dominion Government to appoint three expert Dominion appraisers, whose duty it shall be to supervise the interpretation and operation of the tariff at the various ports of entry, with a view to securing uniformity therein.

It is held by the leading importers that it will be impossible for the Government to retain the expert service required for appraising so long as the present low salaries are paid. So the council, in addition to adopting the resolution, decided to write to the Minister of Customs to recommend that the salaries of appraisers be not less than $3000 per annum. A case that is intended to show the injustice sometimes done to Canadian manufacturers was cited the other day by Mr. Whitton of the Ontario Tack Company. A certain large tack manufacturing concern in the States became incolvent and their stock was sold out at below cost prices—2 cents per pound. Some of the stock was sold to Canadian firms at this figure. A protest was entered with the customs authorities and it was pointed out that the ruling price in the States was just double the figure asked by this particular firm. The customs authorities replied that since the firm sold customers in the States tacks at 2 cents per pound that must be regarded as the correct value of their goods and the appraisement must stand.

Nova Scotia Steel Legislation.

In the speech from the throne at the opening of the Nova Scotia Legislature on the 3d inst. this passage occurs:

I have summoned you to the discharge of your legislative duties at an earlier date than usual in order that you may have the opportunity of considering at once proposed legislation of an urgent character in connection with the affairs of some of the great corporations who are engaged in the development of the coal, iron and steel industries of the province. The importance of these industries in relation to the finances of the province and the prosperity of the country is, I feel assured, a sufficient cause for this early meeting of the Legislature. I invite you to consider the expediency of a short adjournment after the immediate business is disposed of, so that time may be allowed for the completion of the various documents now in preparation which are necessary in the consideration of the general business of the session.

One thing to be done in the short, special preliminary session is the passing of legislation enabling the Dominion Coal Company and the Dominion Iron & Steel Company to carry out their agreement to separate.

Minor Notes.

An extension of the Portland Rolling Mills, St. John, N. B., for the manufacture of nuts, bolts, spikes and horseshoes, is under construction and is expected to be ready for business early in the new year.

C. E. Charbonneau, who acquired the property of the Belleville rolling mills, formerly owned by the Abbott-Mitchell Iron & Steel Company, has sold it to a newly incorporated concern, the Iron & Steel Company of Canada, who have a capital limit of $300,000.

The two new furnaces that are being put in at Copper Cliff by the International Nickel Company, have each a capacity of 550 tons. They are to be used for Bessemer converting and will produce an 80 per cent. nickel-copper metal in a single operation, whereas two treatments were required before to turn out a matte of such high metallic content.

A large body of specular iron ore, which is thought to be of good quality, is being tested by diamond drill near Desharats, Algoma. C. A. C. J.

The Sheet Mill Wages.

(*By Telegraph.*)

PITTSBURGH, PA., December 9, 1903.—On Tuesday morning, December 8, the Independent Sheet Mills met in the Hotel Lincoln, this city, and in the afternoon held a joint session with about thirty of the sheet workers from the Amalgamated Association. Long ago the Independent Sheet Mills made a demand on the Amalgamated Association that the limit of output be removed, and recently made a further demand that they be granted the same reduction in wages that has been made in nonunion sheet mills of the American Sheet Steel Company, and which amounts to about 20 per cent. In the case of the roller the reduction is more than 20 per cent., as he pays the rougher and catcher on the mill, and these two men were not reduced. Nothing was accomplished at the meeting yesterday, and it is again in session to-day. It is the impression that the Amalgamated Association will agree to remove the limit of output, but will refuse the demand for a reduction in wages. In that event the union sheet mills that sign the Amalgamated scale will probably close down all but two or three plants and pool their orders, filling them at the plants that will be operated. Attempts will then be made to start up other mills nonunion, and this would probably be a comparatively easy task as so many sheet workers are idle and are anxious for work. It is certain that the independent sheet mills will not continue to pay the present Amalgamated scale of wages, which is 20 per cent. higher than in nonunion sheet mills until June 30 next year, at which time the present scale expires.

The Oven Equipment & Mfg. Company of Stamford, Conn., were incorporated under Connecticut laws November 24, 1903, to manufacture ovens, oven equipment, furnaces, &c. Walter Ferguson is president, A. W. Dater, secretary and treasurer. They are now fitting up the old electric light plant on Garden street, Stamford, and expect to occupy same in about a week.

Russell W. McKee, for many years a prominent figure in the tin plate and metal trade of New York City, and until last year head of the old established house of Bruce & Cook, passed away on Tuesday, December 8, at the Hotel St. George, Brooklyn, N. Y., after an illness of several weeks. Mr. McKee was born on December 11, 1826, and consequently was within three days of completing his seventy-seventh year. He entered the firm of Bruce & Cook in 1855, and was continuously connected with the house until the spring of last year, when he retired from business, after a service of 47 years. In 1868 he became a partner in the firm, and at the death of John C. Cook, in 1892, he succeeded him as head of the house. Mr. McKee was one of the oldest and most esteemed members of the metal trade in New York, and had a wide circle of friends, both in and out of the business world. He was, during his whole career, actively interested in religious and philanthropic work, and was especially prominent in the Sunday-school movement, being at his death president of the Brooklyn Sunday-school Union. He was also actively identified with a large number of religious, charitable and public organizations, and was regarded as one of the leading citizens of Brooklyn, in which city he had resided for nearly 60 years.

George E. McCague, chairman of the Traffic Managers' Committee of the United States Steel Corporation and traffic manager of the Carnegie Steel Company and Union Railroad at Pittsburgh, Pa., has resigned his position, effective January 1. He will probably be succeeded by L. C. Bishler, at present assistant traffic manager.

Bids on Navy Yard Equipment.

Proposals for the construction of an extension to the coaling plant at the naval station, New London, Conn., were opened at the Bureau of Yards and Docks, Navy Department, on November 28, as follows:

Item 1, price for work complete in accordance with specifications; 2, same as item 1, with one panel length deducted; 3, same as Item 1, with two panel lengths deducted; 4, same as Item 1, except that three panel lengths are deducted; 5, alternate proposal.

The Schofield Company, New York, Item 5, $24,500.

Snare & Triest Company, New York, Item 1, $25,880; (prices after deduction is made), 2, $24,900; 3, $23,800; 4, $22,300; 5, $24,600.

Smith & Robinson, New York, Item 1, $26,379; (prices after deduction is made), 2, $25,554; 3, $24,673; 4, $23,873.

Guarantee Construction Company, New York, Item 1, $28,670; (prices after deduction is made), 2, $27,550; 3, $26,480; 4, $25,410.

New Jersey Foundry & Machine Company, Plainfield, N. J., Item 1, $25,600; (prices after deductions are made), 2, $24,560; 3, $23,520; 4, $22,480; 5, $22,975; 6, $335; 7, deduct $770. Six weeks additional time; alternate proposal, deduct $1640, deductions applying to Items 1 and 5.

The following bids were opened December 1 for supplies for the New York Navy Yard:

Bidder 13. General Incandescent Arc Light Company, New York.
17. Manhattan Supply Company, New York.
25. McCay Engineering Company, Baltimore, Md.
27. Gondey-McLean Company, New York.
34. Prentiss Tool & Supply Company, New York.
47. Brooklyn Fire Brick Works, Brooklyn, N. Y.
59. Westinghouse Electric & Mfg. Company, Pittsburgh, Pa.
63. Doubleday-Hill Electric Company, Pittsburgh, Pa.
69. C. & C. Electric Company, New York.
74. Thresher Electric Company, Dayton, Ohio.
79. B. F. Sturtevant Company, Boston, Mass.
93. Thompson Electric Works, New York.
101. Manning, Maxwell & Moore, New York.
105. Holtzer-Cabot Electric Company, Boston, Mass.
115. General Electric Company, Schenectady, N. Y.
118. Electric Launch Company, Bayonne, N. J.
155. Niles-Bement-Pond Company, New York.
158. Racine Engine & Iron Works, Racine, Wis.
167. Eck Dynamo & Motor Works, Belleville, N. J.
174. Crocker-Wheeler Company, Ampere, N. J.
180. H. B. Coho & Co., New York.

Class 1. Eight generating sets—Bidder 27, $16,368; 158. $37,800; 25, $49,478; 79, $49,892.80; 180, $48,988; 174. $49,832; 74, $51,020; 115, $53,900.

Class 2. Eight 3 horse-power motors—Bidder 74, $984 (?); 167, $1400; 174, $1606; 105, $1696; 63, $1716; 59, $1776; 93, $1856 and $1240; 13, $1842; 115, $1880; 69, $2064; 27, $2107.60.

Class 3. One electric motor and spare parts—Bidder 118. $341.18.

Class 147. Trolley hoists and blocks—Bidder 17, $830; 47, $859.74.

Class 148. One two spindle drill press—Bidder 34, $94.75; 101. $112; 155, $116.

Class 149. One engine lathe—Bidder 101, $360 and $395; 155, $491.

The following awards have been made for supplies for the various navy yards:

League Island and Washington.

Eck Dynamo & Motor Works, Belleville, N. J., class 1, one motor dynamo, $384.

Manning, Maxwell & Moore, New York, class 18, punch forming machine, slitting shears, seamer, &c., $227.26.

Portsmouth, Boston and Newport.

S. A. Woods Machine Company, Boston, Mass., class 14, one upright molding machine, $425; class 15, one horizontal automatic feed hollow chisel mortiser, $540.

Niles-Bement-Pond Company, New York, class 16, one universal cutter and tool grinder, $200; class 18, one wet grinder, $82.

Niagara Machine & Tool Works, Buffalo, N. Y., class 17, one stove pipe forming machine, $16.

R. P. Clark Company, Washington, D. C., one combined punch and shear.

The Bureau of Supplies and Accounts, Navy Department, Washington, will receive bids until December 15 for a pattern makers' lathe and a quantity of exhaust fans, electric motors, generating sets and other supplies for the navy yards, Norfolk, Va., and Charleston, S. C.

Proposals will be received at the Bureau of Supplies and Accounts, Navy Department, Washington, until December 15, to furnish electric motors, various machine tools, electrical and other supplies for the navy yards, Portsmouth, N. H., Boston, Mass., and the naval training station, Newport, R. I.

The Bureau of Supplies and Accounts, Navy Department, Washington, will receive bids until December 15 for furnishing engine lathes, bending rolls and miscellaneous supplies for the navy yards, League Island, Pa., Washington, D. C., and the United States Naval Academy, Annapolis, Md.

Opening of New Steel Plant of the Gould Coupler Company.—The new steel castings plant of the Gould Coupler Company at Depew, N. Y., which has been under construction the past summer, was completed and formally opened for operation on November 30. The buildings are of brick and steel construction and cover several acres. The first heat, which was of basic steel, was run off successfully, President Charles A. Gould and a special party of invited guests from New York City and elsewhere being on hand to witness the trial. The new plant will add about 600 men to the working forces of the company at Depew.

The Inland Steel Company.—CHICAGO, ILL., December 8, 1903.—The Inland Steel Company announce that they will resume operations in all their departments at Indiana Harbor, Ind., next Monday morning, producing sheets, light plates, bars and structural shapes. While they do not state the terms of settlement with their operatives, they indicate that a basis was reached which will guarantee their continuous operation from now on.

Several Cleveland manufacturers who supply material to bicycle manufacturers have made some interesting estimates as to the number of bicycles that will be produced during the coming season, and from these estimates which are claimed to be based on actual parts supplied, it is evident that the bicycle business is by no means the dead issue that many persons imagine it to be. The total output of bicycles for the coming season is estimated at about 400,000 machines. Of these, the Pope Mfg. Company, the outgrowth of the bicycle combine with absorbed some 20 bicycle manufacturing concerns, will produce from 225,000 to 250,000 bicycles in the four factories it now operates. One of the largest independent manufacturers will build 60,000 machines, another 18,000 machines and another 10,000. The ten largest independent makers will aggregate about 140,000 machines, while the balance will be built by small manufacturers and assemblers.

The fire loss of the United States and Canada for the month of November, compiled from the carefully kept records of the New York *Journal of Commerce*, shows a total of $13,589,550, or over $3,000,000 more than in the same month of last year or in the preceding month of this year. The total fire loss for the eleven months ending with November, 1903, is close to $139,000,000, or $5,000,000 above that of the corresponding period of last year.

It is stated that the power house to be erected by the Toronto & Niagara Power Company in Victoria Park, Canadian side of the Niagara Falls, will have a length of 425 feet and a width of 200 feet, the cost to exceed $400,000. If these dimensions are adhered to the structure will be about the largest power house at Niagara. It will be of granite, and exceptional facilities will be afforded visitors for viewing both the electrical installation as well as the upper rapids of the Niagara River.

Effective on Tuesday, December 1, the wages of 321 men employed at the blast furnaces at the Ohio works of the Carnegie Steel Company, Youngstown, Ohio, were reduced 8.47 per cent. Common labor was reduced 6 2-3 per cent.

Joseph T. Ryerson & Son, Chicago, issue a 24-page machinery catalogue, uniform in size with their monthly magazine. This book, bound in pocket book form, with flap, and printed on fine enameled paper, describes a long line of metal workers' punches, shears, hammers, small tools and accessories.

PERSONAL.

H. F. J. Porter, who has been associated with Westinghouse interests since the first of the year and has held the position of assistant manager of the publishing department, with offices in East Pittsburgh, and 10 Bridge street, New York, has been made second vice-president of the Nernst Lamp Company, of which enterprise George Westinghouse is president, with the duties of general manager and headquarters at Pittsburgh. He assumed charge on December 1. This appointment does not affect Mr. Porter's relations with the publishing department at the present time.

Harry G. Stoddard, manager of the Worcester works of the American Steel & Wire Company, who has been in poor health for some time past, is a good deal better and is now at Old Point Comfort, where he is picking up very rapidly.

Thomas Morrison, formerly general superintendent of the Edgar Thomson Steel Works of the Carnegie Steel Company, at Bessemer, gave a house warming at his new home in the East End, Pittsburgh, last week. It was attended by a large number of officials and superintendents of the different plants of the Carnegie Steel Company in the Pittsburgh district.

F. T. F. Lovejoy, formerly secretary of the Carnegie Steel Company, at Pittsburgh, has taken out a permit for a residence in that city to cost about $200,000.

James C. Chamberlain, formerly chief consulting chemist of the American Steel & Wire Company of Pittsburgh, has been appointed chief chemist at the Edgar Thomson Steel Works of the Carnegie Steel Company, succeeding Charles B. Murray, resigned. Mr. Murray has accepted the position of chief chemist to the Pittsburgh Glass Company, St. Louis. He was presented by his associates before leaving with a chest of silver.

Thomas Morrison and A. R. Peacock, formerly of the Carnegie interests of Pittsburgh, are organizing a national bank, to open in St. Louis about January 1.

It is reported that H. C. Frick of Pittsburgh will be elected a director of the Pennsylvania Railroad when the next vacancy on the board occurs.

J. H. Price, who recently resigned as district manager of the American Steel & Wire Company, at Pittsburgh, to become assistant to the president of the Pittsburgh & Buffalo Coal Company, was presented last week with a fine leather chair. The presentation speech was made by W. L. Hirsch, sales agent of the American Steel & Wire Company.

J. H. Craig, formerly auditor of the Lorain Steel Company, at Lorain, Ohio, has been appointed assistant comptroller of United States Steel Corporation, with headquarters in New York City. Before leaving Lorain, Mr. Craig was presented by the officials and office employees with a diamond cluster stick pin.

It is reported that John F. Taylor, now treasurer and one of the directors of the Republic Iron & Steel Company, will retire from this concern at the end of the year. It is understood that Mr. Taylor proposes to engage in another line of business.

Joseph Wharton of Philadelphia has presented $50,000 to Swarthmore College, in Delaware County, Pa., to assist in the erection of a dormitory for the college. This dormitory, it has been decided by the college authorities, shall be called Wharton Hall.

Felix F. Wiener, manager of Henry Pels & Co., manufacturers of beam shears and punches, New York, has returned from a short business trip abroad. He visited the main office in Berlin and also the Erfurt works, for the purpose of studying some new constructions that will be introduced in the machines next year.

W. C. Andrews of New York, who is well known as a technical writer in the electrical field and who until very recently was in charge of the New York office of E. P. Roberts & Co., consulting engineers, of Cleveland, Ohio., has just joined the forces of the Stanley Instrument Company of Great Barrington, Mass. Mr. Andrews will serve as engineer to the sales department.

The Resignation of A. B. Wolvin.

CLEVELAND, OHIO, December 8, 1903.—The announcement was made officially a few days ago that A. B. Wolvin has resigned as general manager of the Pittsburgh Steamship Company, the lake end of the United States Steel Corporation. The announced cause for this severance of his connection is that his other business demands so much of his attention as to make it impossible for him to continue at the head of the company. Mr. Wolvin is a leading figure in a syndicate, which is building a line of boats to carry grain from the head of the lakes through the St. Lawrence River and Canadian canals to Montreal. It is presumed that this business, together with his association with the Great Lakes Towing Company and other concerns, demands so much of his time as to make his resignation necessary. It is freely admitted that the Pittsburgh Steamship Company at this time needs a head familiar with the lake interests. In fact, the company are about approaching a crisis in which it is believed the need of a careful and well informed manager will be felt very seriously. During the past few years the labor unions of the lakes have been more than commonly mandatory in their requests for increased pay. The Lake Carriers' Association was reorganized and incorporated to combat this influence, but ended by yielding after a number of futile efforts at correcting the evil. The readjustment has now come to be almost necessary, as freights are low and expenses inordinately high. Mr. Wolvin, at the head of the Pittsburgh company, tried to straighten out some of the snarls, but being deserted by the other vessel interests, was compelled to yield on the points he had raised. The lake vessel interests, however, are now about united in their determination to correct some of the abuses, and it is, of course, understood here that the new head of the Pittsburgh fleet will be supposed to take the lead. It is not a very inviting task.

The Pittsburgh Foundrymen's Association.—The monthly meeting of the Pittsburgh Foundrymen's Association was held at Engineers' Hall, 410 Penn avenue, Pittsburgh, on Monday evening, December 7. This was the largest meeting in the history of the association, about 40 foundries being represented in person, which attests strongly to the interest being taken by the Pittsburgh foundrymen in this organization. Charles V. Slocum was in the chair, and F. H. Zimmers was secretary. Two papers, entitled "Pattern Making," one by Edward C. Fitzgerald, superintendent of the Manual Training Department of the North School, Pittsburgh, and the other by J. C. Warren of the Pennsylvania Casting Machine Company, were read and listened to with considerable interest. At the next meeting of this association the question of having suitable exhibits at the World's Fair, St. Louis, next year, will be taken up and discussed. A representative from the St. Louis Exposition is expected to be present and address the association on this subject.

An interesting controversy has developed over formulas for detinning scrap tin. The Vulcan Detinning Company have brought suit for a permanent injunction to restrain the American Can Company from further use of the detinning process owned by the former company, and which is now being used by the latter. The claim is made that F. A. Assmann, now president of the American Can Company, secured his knowledge of the detinning formula while a member of the Board of Directors of the original company owning the process to which the Vulcan Detinning Company are successors.

Robert A. Jennings, receiver for the Carpenter Steel Company of Reading, Pa., has been authorized by the court to issue $150,000 loan certificates for funds with which to carry on the business until May 1. The receiver's report presented in making the application shows the Carpenter Company to have assets amounting to $494,372 and liabilities of $298,370. The report says that the pending Government contracts are very profitable and that the business can be made a going concern, or sold at private sale.

OBITUARY.

THOMAS H. BUCKLEY, president of the T. H. Buckley Car Mfg. Company, died at his home in Worcester, Mass., Tuesday, the 1st inst., after a 48 hours' sickness of peritonitis. He was 35 years of age. He was a native of New London, Conn., and after a common school education started out to earn his living. After a few years he got into the night lunch business, finally going into the manufacture of these vehicles, and was very successful. A few months ago he decided to combine the manufacture of street cars with his night lunch cart business and work on the new shops at Worcester is now well under way.

WILLIAM P. HOOD, a retired manufacturer of structural and ornamental iron work in Philadelphia, Pa., died November 24, aged 78 years. He furnished much material for fine residences and public buildings in Pennsylvania and the South. The business is now in the hands of his sons, Henry and William P. Hood.

THADDEUS A. NEELY, inventor of the adjustable roller skate, died at his home in Muncie, Ind., December 4. He was 60 years old.

FREDERICK C. DREWS, general superintendent of the Chicago & Great Lakes Dredging Company, was run down and instantly killed by an Illinois Central express train December 3. Mr. Drews was born in Germany in 1842. He came to Chicago after the war of the rebellion, and a few years later started what is now the Chicago & Great Lakes Towing Company. In 1880, with Henry C. Lydon, who only ten days ago succumbed to heart disease, Mr. Drews began business under the firm name of Lydon & Drews, and with his early partner was closely associated, first with the above named firm, and later in the larger company, until Mr. Lydon's death.

CAPT. BENJAMIN F. JENNINGS, a pioneer steel manufacturer of Pittsburgh, died at his residence in Allegheny last week of nervous collapse. He was born in Allegheny in 1838 and served during the Civil War. In the following years he was connected with the firm of Riter, Sutton & Co., and later, Smith, Sutton & Co., owners of the La Belle Steel Works, in Allegheny, now a constituent interest of the Crucible Steel Company. Later Captain Jennings was connected with Jennings, Beale & Co., manufacturers of sheet steel, with works at Leechburg, Pa.

EDWARD ARTHUR MOEN died in New York City on December 4, aged 62 years, from the effects of an operation performed the day before. He was born in New York and for a long time represented the Washburn & Moen Mfg. Company of Worcester, Mass., of which his brother, Philip L. Moen, was a founder. He afterward formed the firm of Cary & Moen, steel spring manufacturers, and later engaged in the real estate and insurance business.

S. FRANK FULLER of the tin plate and metal firm of William Fuller & Co., Baltimore, Md., died November 30 from pneumonia, at his home in that city, aged 52 years. He was born in Baltimore and was a son of the late William Fuller, the founder of the house.

JOHN R. BRINGHURST, formerly a well-known iron manufacturer, operating sheet mills at Marshallton, Del., died suddenly on December 7 at his home at Ashland, near Wilmington, Del.

GEORGE S. KING, founder of the Cambria Iron Works, now the Cambria Steel Company, died December 8, at the home of his daughter in Johnstown, Pa., in his ninety-fifth year. He was born at Hagerstown, Md., and when a child removed with his parents to Mercersburg, Pa. In 1833 Mr. King settled at Johnstown and became interested in the iron ore deposits there. Eight years later he interested local capital in a company for the manufacture of iron, and built a furnace, from which small beginning the large Cambria Iron Works were developed. He served as a representative of the district in the Pennsylvania State Legislature in 1855.

ROBERT GRIMES, former president of the Elmira Bridge Company, and one of the most noted bridge builders in the country, died December 8 at his home in Elmira, N. Y., after a long illness, from paralysis. Mr. Grimes built the New York Central viaduct leading from the Harlem River to the tunnel in New York City, the cantilever bridge at Louisville, Ky., at the time of its construction the largest bridge in the world, and many other noted structures. On his retirement as president of the Elmira Bridge Company the concern were absorbed by the American Bridge Company.

Labor Notes.

Judge Jesse Holdom, in a Chicago local court on December 4, decided that Franklin Union of Press Feeders are in contempt of court as an organization for appointing and permitting pickets to interfere with the rights of individuals who had taken the place of striking press feeders. This is said to have been the first time in this country that a trade union has been found guilty of illegal action as a corporate body. The union and its officers were cited to appear before the court.

Steps are being taken toward forming a new international association by the New York Housesmiths' Union, which is the new organization of structural iron workers formed by seceders from the old No. 2 Union, familiarly known as Parks' union. The new organization has the support of the Employers' Association of the New York building trades.

The labor troubles at the works of the American Optical Company at Southbridge, Mass., are practically at an end. Many of the strikers have returned to work, signing the agreement that they will no longer affiliate with any union. Men from outside the town have taken the places of some of the others. The force is practically full. The smaller concerns involved in the trouble with the union are as well off. Only a little money has been received in strike benefits, although the leaders, officers of the union from out of town, are still promising financial assistance. The incident is generally considered to be practically closed.

Announcement is made of a reduction in the wages of all furnace workers in the Mahoning and Shenango valleys to take effect December 16. The cut will range from 10 to 20 per cent. All the furnaces of the United States Steel Corporation will make a corresponding reduction.

The general exodus of members from Local No. 2, Parks' old union of housemiths, over into the new Housesmiths' Union of New York had reached such proportions on December 8 that President Patrick McGuire of the new union was compelled to send word to C. E. Cheney, secretary of the Iron League, not to sign any more men for the present. Mr. Cheney says that over 500 men from Parks' old union have signed the employers' arbitration plan and become members of the new Housesmiths' Union since the middle of last week.

At Pittsburgh, James McNeil & Brother, boiler manufacturers, have brought suit against the Park Steel Company, now a constituent interest of the Crucible Steel Company of America, to recover $75,000 damages, alleged to have been done to the works of the plaintiff company by the explosion of a battery of boilers at the plant of the Park Steel Company on December 20, 1901. It is alleged that the *débris* from the explosion fell upon and into the plant of James McNeil & Brother, and damaged it to the extent of the amount for which suit is entered.

The United States Court of Appeals, at Cincinnati, on December 8, delivered a decision against trusts, giving to persons or corporations obliged to pay excessive prices, a right to recover damages in three times the amount sustained. The decision was handed down in the appealed case of the city of Atlanta against the Chattanooga Pipe & Foundry Works and the South Pittsburgh Pipe Compaany. The city of Atlanta had been obliged by the pipe combination then existing to pay an excessive price for materials for their water works conduit and sued to recover.

Pig Iron Production Heavily Reduced

Stocks Show an Increase.

As the full details below show, the production of pig iron has been heavily reduced during November and promises to show a still further decline. Stocks, however, were added to during November by the merchant furnaces.

The total capacity of all furnaces in operation has been reduced, as is shown by the following table of the weekly capacity of the furnaces in blast on December 1, compared with preceding monthly periods:

	Total capacity per week. Gross tons.	Coke capacity per week.	Charcoal capacity per week.
December 1, 1903	251,181	241,407	9,774
November 1	282,219	273,715	8,504
October 1	361,492	353,142	8,350
September 1	369,933	360,197	9,736
August 1	362,330	353,681	8,649
July 1	395,042	384,825	10,217
June 1	398,139	388,178	9,961
May 1	381,697	373,496	8,201
April 1	376,576	368,215	8,361
March 1	354,733	347,424	7,309
February 1	343,111	335,339	7,772
January 1	353,800	346,073	7,727
December 1, 1902	343,817	336,617	7,200
November 1	337,559	330,110	7,449
October 1	345,048	337,837	7,211
September 1	335,189	328,243	6,946
August 1	336,465	328,745	7,720
July 1	310,950	303,793	7,157
June 1	344,748	337,492	7,256
May 1	352,064	337,627	6,437
April 1	337,424	331,140	6,284
March 1	323,028	316,039	6,989
February 1	332,045	325,440	6,605
January 1	298,460	291,992	6,468
December 1, 1901	324,761	317,358	7,403

Coke and Anthracite Furnaces in Blast.

Location of furnaces.	Number of stacks.	December 1. Number in blast.	December 1. Capacity per week.	November 1. Number in blast.	November 1. Capacity per week.
New York	18	8	10,152	9	10,668
New Jersey	8	4	2,604	4	2,881
Spiegel	3	1	169	1	166
Pennsylvania:					
Lehigh Valley	27	14	8,184	15	8,529
Spiegel	1	1	103	1	93
Schuylkill Valley	13	7	5,159	9	7,123
Low. Susquehanna	10	2	3,030	5	6,591
Lebanon Valley	12	2	1,411	3	2,445
Pittsburgh District	37	22	60,759	23	65,834
Spiegel	2	2	1,534	1	340
Shenango Valley	19	6	8,163	8	11,731
West. Pensylvania	18	15	21,911	17	22,553
Spiegel	1	1	815	0	0
Maryland	5	3	5,718	3	6,541
Wheeling District	12	2	2,959	5	6,715
Ohio:					
Mahoning Valley	15	8	15,431	8	14,982
Cent. and North	16	5	10.300	8	15,310
Hocking Valley	2	0	0	0	0
Hanging Rock	12	6	4,224	6	3,868
Illinois	19	12	25,529	15	28,626
Spiegel	2	2	1,424	2	1,000
Minnesota	1	0	0	0	0
Wisconsin	5	3	2,352	3	3,196
Missouri	1	0	0	0	0
Colorado	5	3	2,427	3	4,295
The South:					
Virginia	23	11	7,778	12	7,876
Kentucky	8	4	1,961	4	2,115
Alabama	41	29	30,439	32	33,125
Tennessee	16	10	6,436	11	6,580
Georgia	1	1	435	1	532
North Carolina	2	0	0	0	0
Totals	355	184	241,407	210	273,715

The falling off has been greatest in the Central West, in which we include the Pittsburgh, Wheeling, Shenango Valley, Lake counties, Mahoning Valley and Chicago districts, and in the East, which includes New York, New Jersey, and the Schuylkill, Lehigh, Upper Susquehanna and Lebanon valleys. A comparison of these two since September 1, when production was normal, and December 1, with restriction in full effect, is shown in the following table:

Capacity in Tons Per Week.

	Dec 1.	Nov. 1.	Oct. 1.	Sept. 1.
Central West	128,451	144,538	216,249	219,516
East	30,812	38,486	47,648	52,237
Totals	159,263	183,024	263,897	271,753

The South has fallen off somewhat, the capacity declining from 56,751 tons on October 1 to 50,228 tons on November 1, and to 47,049 tons on December 1.

There were blown out or banked during November Oxford in New Jersey, one Swede and one Warwick in the Schuylkill Valley, one Crane in the Lehigh Valley, two Pennsylvania Steel and one Paxton in the Lower Susquehanna, and Robesonia in the Lebanon district. In the Pittsburgh district an Edgar Thomson stopped work; but, on the other hand, one furnace started on spiegeleisen. In the Shenango Valley Fannie blew out on the 20th, Newcastle No. 1 stopped and one Shenango furnace blew out. Mabel, however, started. In the Wheeling district all of the furnaces of the United States Steel Corporation were idle on the 1st of this month. In the lake counties, Emma and Toledo blew out in November. In the Mahoning Valley Grace stopped on November 13, and Mattie on the 8th, but late in the month two of the Ohio furnaces blew in. In the Hanging Rock region Etna was blowing again, but Union stopped for repairs on the 27th ult. In the Chicago district the second Calumet stack was blown out on the 28th and at the South Chicago plant four furnaces were running, as compared with six on November 1. In the South, Bristol in Virginia and one Alice and one Ensley in Alabama went out in November.

One of the Buffalo furnaces, which was operated with coke for a while is now again making charcoal pig and has been transferred to that list.

Charcoal Furnaces in Blast.

Location of furnaces.	Number of stacks.	December 1. Number in blast.	December 1. Capacity per week.	November 1. Number in blast.	November 1. Capacity per week.
New England	5	2	185	2	191
New York	3	1	736	1	50
Pennsylvania	5	2	120	2	109
Maryland	1	1	103	1	100
Virginia	4	2	118	2	116
Ohio	8	4	260	4	242
Tennessee	2	1	54	1	76
Georgia	4	2	762	2	815
Alabama	5	4	1,254	4	1,490
Michigan, Missouri and Wisconsin	14	10	5,725	9	5,070
Texas	4	1	257	1	245
Totals	55	30	9,774	29	8,504

The following table shows the production in gross tons for the month of November, as compared with the four proceeding months, the production of the first six months of the year 1903 having been 9,707,367 tons.

Monthly Pig Iron Production.

	July. (31 days)	August. (31 days)	September. (30 days)	October. (31 days)	November. (30 days)
New York	44,137	39,154	49,664	48,236	43,558
New Jersey	19,533	19,535	18,263	14,830	12,460
Schuylkill	41.143	45,759	47,744	38,750	28,720
Lehigh	60,861	56,540	45,938	35,862	37,350
Susq. and Lebanon	57,920	60,758	49,629	42,988	26,852
Pittsburgh	402,779	405,595	385,967	357,704	242,640
Shenango	108.234	88,484	84,827	81,232	32,929
West. Penn	91,570	101,678	102,801	102,789	97,397
Md., Va and Ky.	80,214	70,874	64,395	71,168	64,509
Wheeling	86,916	75,582	81,305	44,413	18,071
Cent. and No. Ohio	105,127	110,426	122,077	87,810	52,784
Mahoning V.	98.541	117,217	106,601	94,801	47,344
Hanging Rock and Hocking Valley	28,186	31,329	28,437	25,492	20,464
Ill., Wis., Minn., Mo. and Col.	201,386	208,778	201,070	200,062	145,527
Alabama	81,439	104,357	133,008	148,527	134,711
Tennessee. No. Carolina and Georgia	38,198	35,060	34,991	29,992	29,968
	1,546,184	1,571,126	1,553,717	1,425,656	*1,035,284
Charcoal pig	44,432	42,995	42,986	37,537	38,556
Totals	1,590,616	1,614,121	1,596,703	1,462,193	1,073,840

* Production estimated 13,300 tons.

It will observed that there has been a sharp decline in the production in every district in the Central West and in the the greater number of those of the East. It is particularly striking in the case of the Wheeling district, Pittsburgh; the Mahoning Valley and the Chicago district. The South produced normally.

Production of Steel Companies.—Returns from all the plants of the United States Steel Corporation, the Cambria, Pennsylvania, Maryland, Lackawanna, Wheeling, Ashland, Republic, Jones & Laughlin, Clairton, La Belle, Bethlehem and Colorado companies show a total product of 553,067 tons for November, as compared with 829,215 tons for October, 956,363 tons for September, 993,564 tons in August, 987,855 tons in July, 1,021,839 tons in June, 1,037,325 tons in May and 966,850 tons in April.

Production of Spiegeleisen.—The production of spiegeleisen and ferromanganese was 17,695 tons in November, as compared with 10,374 tons in October, 8406 tons in September, 15,862 tons in August, 14,933 tons in July, 16,309 tons in June, 17,600 tons in May and 17,555 tons in April.

Stocks.

The position of furnace stocks sold and unsold, as reported to us, was as below on December 1, as compared with the preceding months, the same furnaces being represented as in former months. This does not include the holdings of the steel works producing their own iron:

Stocks.	July 1.	August 1.	Sept. 1.	Oct. 1.	Nov. 1.	Dec. 1.
Anthracite and Coke.	234,425	311,174	356,701	450,193	539,810	588,185
Charcoal...	22,585	31,289	45,305	56,245	57,589	69,922
Totals...	257,010	342,463	402,006	506,438	597,399	658,107

An analysis of the stocks of anthracite and coke irons held by merchant furnaces may prove of interest. We separate them into three groups, the East, including New York, New Jersey, the Lehigh, Schuylkill and Lower Susquehanna, Lebanon and Western Pennsylvania; the Central West, including the Shenango and Mahoning valleys, the Lake counties, the Hanging Rock and the Chicago district, and finally the South, including Virginia, Kentucky, Alabama, Tennessee, Georgia and North Carolina.

Stock of Anthracite and Coke Pig Iron.—Gross Tons.

	Dec. 1.	Nov. 1.	Oct. 1.	Sept. 1.
East	145,622	137,662	125,112	105,406
Central West	157,521	135,098	96,476	66,560
South	285,042	267,050	228,605	184,735
Totals	588,187	539,810	450,193	356,701

It will be observed that there was a moderate accumulation of stock in each of the great producing sections.

An indication concerning steel works stocks is furnished by the following figures. They represent the monthly product of the furnaces which report their stock regularly, the second column showing the total stock of the same producers at the end of each respective month:

	Product. Tons.	Stock at end of month. Tons.	Increase or decrease. Tons.
November	24,952	77,046	−45,744
October	110,753	122,792	+1,672
September	163,052	121,120	+36,670
August	174,882	84,450	+30,956
July	190,204	53,494	....

Accumulation, it will be observed, began in August and was greater in September. It was checked in October by a sharp restriction of output. The stocks were heavily drawn upon in November, the production falling to a very low figure.

Iron and Industrial Stocks.

The market has been strong since last report. A rumor that the financial needs of the Colorado Fuel & Iron Company had been met by a plan which received the approval of the debenture bond holders caused the common stock of that company to rise to 29 on Friday, as compared with 26¾ on the preceding day. The advance was not fully sustained, but the subsequent strength of the general market kept prices up to a fraction under this figure. United States Steel preferred sold up to 59, with very heavy transactions at the advancing prices. Bear operators were badly punished. American Can preferred sold up to 33 during the week, as compared with 30½ on last Thursday; American Car & Foundry common advanced from 19 to 20¼, and the preferred from 66 to 67⅞; Locomotive common, from 14⅞ to 15½, and the preferred from 76¼ to 78½; Cambria Steel, from 17½ to 18¾; Pressed Steel common, from 24½ to 28, preferred from 67 to 68¾; Railway Spring preferred, from 75½ to 78; Republic common, from 6¾ to 7⅜, preferred from 39¼ to 43¼; Sloss-Sheffield common, from 25 to 30⅜; Tennessee Coal & Iron, from 30 to 34¼; United States Steel common, from 11 to 12⅜, preferred from 52¾ to 59, and the new 5's from 68½ to 71⅝. Crucible Steel preferred ranged from 30 to 31. The last sales of active industrials up to 1.30 p. m. on Wednesday, were made at the following prices: Car & Foundry common 19¾, preferred 67½; Locomotive common 15⅝, preferred 78; Colorado 28⅜; Pressed Steel common 27, preferred 68; Railway Spring common 18½, preferred 77¾; Republic common 7, preferred 42¼; Sloss-Sheffield common 29¼, preferred 72; Tennessee 33⅜; Steel common, ex dividend, 11⅜, preferred 58, new 5's 71¼.

The income account of the Sloss-Sheffield Steel & Iron Company for the quarter ended November 30 is as follows, compared with the same quarter of the previous year:

	1903.	1902.	Decrease.
Profit from operations	$329,804	$577,553	$247,749
Depreciation and extraordinary repairs and renewal fund	44,189	56,263	12,074
Net earnings	$285,615	$521,290	$235,675
Taxes and interest, three months	60,000	60,000	.....
Balance	$225,615	$461,290	$235,675
Preferred dividend	114,000	114,000	.....
Surplus	$111,615	$347,290	$235,675
Surplus brought forward	2,224,497	853,356	*1,371,141
Total surplus, Dec. 1	$2,336,112	$1,200,646	*$1,135,466

* Increase.

National Steel & Wire Company.—The National Steel & Wire Company have acquired the stock of the Safety Insulated Wire & Cable Company of Bayonne, N. J., under the following conditions: Stockholders of the Safety Company are offered $1,500,000 National Company common stock in exchange, dollar for dollar, and the Safety Company first mortgage 6 per cent. bonds ($1,250,000 outstanding) will be exchanged at par for a like amount of preferred stock of the National Company. An additional $250,000 preferred stock will be sold at par. This will increase the National's outstanding stock to $4,000,000 of common and $4,000,000 of 7 per cent. cumulative preferred stock, the authorized capital being $5,000,000 of each. The National Company have been furnishing the Safety Company with a large portion of their wire requirements. The surplus earnings of both companies above depreciation applicable to dividends on the combined common stocks of the two companies, as certified by Price, Waterhouse & Co., is at the rate of something over 10 per cent., and a continuance of at least the same rate is expected, since three new mills of the National Company will be in operation within three months. The working capital of the combined properties under the plan, which has been underwritten, will be about $1,600,000, equal to 20 per cent. of the entire capitalization. The executive management of the two companies will remain unchanged.

Dividends.—The next dividend on Westinghouse Electric & Mfg. Company stock is payable on January 10 next. While the dividend has not as yet been declared, it is understood that it will be at the rate of 10 per cent. per annum, or 2½ per cent. for the quarter.

The Westinghouse Air Brake Company of Pittsburgh have declared the regular quarterly dividend of 2½ per cent. and an extra dividend of 3½ per cent., payable January 11.

Sloss-Sheffield Steel & Iron Company have declared the regular quarterly dividend of 1¾ per cent. on the preferred stock, payable January 2. Books close December 19 and reopen January 4.

Ashton Valve Company, Boston, Mass., have declared an extra dividend of 1 per cent., payable December 15.

Westinghouse Air Brake Company, Pittsburgh, have declared the regular quarterly dividend of 2½ per cent. and an extra dividend of 3½ per cent., payable to stock of record January 11.

International Silver Company have declared a quarterly dividend of 1 per cent. on the preferred stock, payable January 1.

National Enameling & Stamping Company have declared annual dividends of 7 per cent. on the preferred and 4 per cent. on the common stock, payable in quarterly installments in January, April, July and October.

Geo. Crawford has been appointed superintendent of the plant of the McKeesport Tin Plate Company at McKeesport, Pa., succeeding William E. Davey, who recently resigned to become superintendent of the plant of the Washington Charcoal Iron Tin Mills at Washington, Pa.

MANUFACTURING.

Iron and Steel.

On December 1 the lining of one of the furnaces of the Thomas Iron Company, at Hellertown, Pa., fell in.

The Central Iron & Steel Company, Harrisburg, Pa., hope to put their new open hearth department in operation shortly after the first of the year. The structural iron is nearly all in place and the machinery is being rapidly set up. The company will then be practically independent of all other corporations and will not, as at present, be compelled to buy their open hearth steel from outside firms. The new plate mills of the company will not be completed until a later date. They will replace those destroyed by fire last spring. One of the mills is being operated beneath a temporary structure.

The Sternbergh plant of the American Iron & Steel Mfg. Company, at Reading, Pa., has resumed operations with a full force of workmen on a special order for the first time in five months. The plant has been running only three and four days a week, but officials say that the outlook is now more promising.

The Ellis & Lessig Iron Company, Pottstown, Pa., resumed operations on Monday, December 7, in the puddle mill department with a full force, after a long idleness.

The Carpenter Steel Company, Reading, Pa., which are being operated under the direction of a receiver, are making larger outputs than under the old management. There is some prospect that the company can eventually be placed once more on a firm financial basis.

The Pennsylvania Steel Company, Steelton, Pa., have received orders for the manufacture of about 8000 tons of steel rails for a new trolley line, financed by Pittsburgh, Pa., capital, to be built in Mexico City, Mexico. The company have reduced their force at Steelton during the past week by the laying off of nearly 50 men.

John Graham has been appointed receiver for the Crum Lynne Iron & Steel Company, Crum Lynne, Pa.

The Boston Steel & Iron Works, Boston, Mass., intend to enlarge their works next spring.

The McClintic-Marshall Construction Company, with works at Pittsburgh and Pottstown, Pa., builders of steel buildings, bridges, &c., have received a contract for the erection of a new bar mill for the Lackawanna Steel Company of Buffalo, N. Y., which will require about 575 tons of structural steel. They also have the contract for a large steel building for the Ward-Dickey Steel Company, at Indiana Harbor, Ind.; a bridge for the Pittsburgh & Lake Erie Railroad, at Lowellville Junction, and several other medium sized jobs, aggregating several thousand tons.

Furnace G of the Carnegie Steel Company's Edgar Thomson group, at Bessemer, Pa., was closed down last week for relining and repairs and will be idle several months. This makes three furnaces at the above plant that are now idle, furnaces C and H having been shut down some time ago for extensive repairs, which are nearly completed.

The eight mills at the Muskegon works of the American Tin Plate Company, at Muskegon, Mich., are to be removed to the South Sharon works, at South Sharon, Pa. This will give the South Sharon plant a total of 28 hot mills, making it the second largest plant owned by the American Tin Plate Company.

Genesee Furnace, at Charlotte, N. Y., will blow out about December 12 for relining and other repairs.

General Machinery.

The directors of the Illinois Bridge & Machine Company, Jacksonville, Ill., have appointed Nelson McMurphy of Springfield and Edgar E. Crabtree as members of the board, to fill vacancies caused by the resignation of John R. Robertson and Arthur H. Rankin. The company expect to be in the market for machinery some time next spring, at which time their capacity will be increased.

Work has begun on the new blacksmith shop at the Charlestown Navy Yard. The smithy proper will be 120 x 350 feet, with the power house as a continuation 100 feet long.

The Koch Mfg. Company, Grinnell, Iowa, organized by H. W. Spaulding, J. C. Goodrich and A. A. Koch, have about completed the construction of buildings which will comprise their plant. These buildings consist of a machine shop, 60 x 100 feet and two stories in hight, built of brick, and a foundry, 40 x 60 feet in dimensions. The company manufacture power hammers, tenon machines, and punches and shears for blacksmiths and machine shop use. The new plant will be in operation about January 1. The company will probably be in the market for machine tools, such as lathes, drills and milling machines.

The Lake Shore Engine Works, Marquette, Mich., have reduced wages in all departments 10 per cent. At the shops of the Duluth & South Shore Railroad, in that city, hours of labor have been cut to nine daily, with a proportionate reduction in wages. Several hundred men are affected.

The Gardner Governor Company, Quincy, Ill., in speaking of business conditions, report the volume of trade well maintained until about the middle of September, when it very suddenly dropped off and has not as yet picked up or shown any indications of doing so. They are running with a full force of men, however, and expect to do so all winter, in order to build up their very badly depleted stock of goods.

Plans are being prepared for a 15-stall roundhouse to cost $30,000 and a machine shop to cost $8000, for the St. Louis, Kansas City & Colorado Railroad, to be built at St. Louis. W. M. Harley, Jr., Chicago, is the architect.

The American Gas Machine Company, Albert Lea, Minn., who recently incorporated with larger capital, will require some additional machinery for their plant. They manufacture patented gas lamps and a gas lighting system.

Work at the plant of Greenless Bros., Rockford, Ill., is advancing rapidly. The buildings which the company are erecting comprise a machine shop, which will be one story high, 160 x 250 feet, and a foundry, 80 x 150 feet, with grinding room, core room and cupola room additional.

It is stated that poor trade conditions have caused the Brown & Sharpe Mfg. Company, Providence, R. I., to lay off 600 men for an indefinite period, and to reduce the hours of the remaining machinists from 60 to 50 per week.

The Star Tool Company have been incorporated at Buffalo, N. Y., and will engage in the manufacture of patent angle bits and drills and other patented tools. A factory has been secured on Mississippi street. The incorporators are Gilbert L. Hume, William A. Pearce, and Herbert A. Hickman of Buffalo.

S. B. Stein & Son, Osceola Mills, Pa., manufacturers of mining machinery, will rebuild their plant, recently destroyed by fire, on a larger scale.

The Roth Mfg. Company have been organized at Columbus, Ind, with $50,000 capital, to manufacture the Roth pitless pump, which is especially adapted for the Texan rice fields for irrigating purposes. H. M. Campbell is president, J. G. Roth, vice-president; H. H. Bassett, secretary; William G. Irwin, treasurer.

The Hopkins Machine Works, Providence, R. I., are rebuilding the part of their plant which was recently destroyed by fire. They inform us that the power plant was not damaged and that they are not in the market for any machinery at present, unless possibly a No. 2 Universal milling machine.

Madden & Co. of Rushville, Ind., have shipped one of their "plugger" tile making machines to Porto Rico. It will manufacture tile for a drainage system the Government is experimenting with there in the low lands.

The Commercial Club of Lafayette, Ind., are negotiating with J. T. Headson of the Headson Tool Mfg. Company, New York, with $100,000 capital, for the location of the plant in the Indiana city. The company manufacture pipe cutters and automatic wrenches.

We are advised that there is no truth in the report that the Philadelphia & Reading Railway Company intend to enlarge their locomotive and car repair shops, at Reading, Pa.

The superintendent of the Herring-Hall-Marvin Safe Company's plant, at Hamilton, Ohio, has been authorized by the company to purchase a few new machines for installation at that point.

The Ohio Quarries Company, Cleveland, Ohio, operating extensive stone quarries at North Amherst, Ohio, are erecting a large machine shop and boiler house at the latter place, and are purchasing equipment for same.

The Elwood Iron Works, Elwood, Ind., have recently added an 84-inch boring mill and lathe to their plant, and are now undertaking the manufacture of a new rotary brick press, intended especially for the sand lime brick process. Their business up to the present time has been largely in machinery for tin plate mills, as well as a general foundry and machine business.

The Standard Tool Company, Cleveland, Ohio, report that while they experienced a pronounced falling off in business a couple of months back, it is now showing a decided improvement, and they believe the demand will soon be back to normal. They report quite an increase in the demand from abroad, and the Canadian trade is holding up very strong.

The Geo. L. Squier Mfg. Company branch of the Buffalo Forge Company, Buffalo, N. Y., have just received a large contract for an outfit of sugar machinery for a plantation in Hayti. The order includes engines, double effect; vacuum pan; boilers, centrifugal; deflectors, clarifiers, sugar pumps and everything required for a complete sugar producing plant. The same company also executed orders for several large vacuum pans for Mexican customers. The Buffalo Forge Company are fulfilling contracts for ventilating and heating apparatus, as follows: For the Norfolk & Western Railroad, Portsmouth, Ohio, oil house, 71 x 47 x 25 feet; erecting shop, 302 x 70 x 52 feet; planing mill, 120 x 70 x 36 feet; machine shop, 160 x 70 x 36 feet; International Harvester Company, Chicago, Ill., finishing department, 240 x 55 x 44 feet, and Ramapo Iron Works, Niagara Falls, N. Y., frog and crossing shop, 270 x 73 x 30 feet; blacksmith shop, 120 x 78 x 40 feet; switch shop, 270 x 60 x 30 feet.

Power Plant Equipment.

The Twin City Rapid Transit Company, Minneapolis, Minn., are installing three large rotaries in both the substation at Minneapolis and that at St. Paul Each of these six rotaries is of 1500 kw. capacity and weighs 50 tons.

The San Bernardino Valley Traction Company, San Bernardino, Cal., have recently installed a duplicate set of their original substation equipment. The units are of 200 kw. each, synchronous motor-generator set, wound for 11,000 volts.

The Bullock Electric Mfg. Company, Cincinnati, Ohio, will supply two generators and two exciters for the new municipal light and power plant at Seattle, Wash. The generators are of 1200 kw. capacity each, three-phase, revolving field machines, 60 cycles, 2300 volts, and will be directly connected to a Pelton water wheel. The exciters are of 75 kw. each, 125 volts.

The Borough of Meyersdale, Pa., is having plans and specifications drawn up for an electric light plant. J. S. Graves is chairman of Light Committee.

Some little machinery is required by Charles H. White & Son, 268 Morton street, Albany, N. Y., who have leased the shops of the Oneida Iron Works, which they are equipping for general boiler, sheet iron and stack work. A large part of the equipment has been purchased. The firm will commence business January 1.

The Jacobson Machine Mfg. Company, Warren, Pa., are now in position to fill all orders for their gas and gasoline engines of all sizes.

The Lambert Gas & Gasoline Engine Company, Anderson, Ind., are putting up a factory built from concrete blocks molded on the grounds and set into a steel frame work. The main building is 60 x 524 feet, with a wing 60 x 100 feet, and will cost $75,000. Power will be supplied from a battery of gas engines of their own make, using natural gas. They expect to move into their new plant in April.

The Westerfield Motor Company, Anderson, Ind., have moved into the plant of the Johnson-Reynolds Company, which gives them enlarged facilities for the manufacture of their line of small motors, for automobiles and other light power purposes.

The E. H. Clay Company, Chagrin Falls, Ohio, have commenced the manufacture of gasoline engines, for stationary and automobile use, besides which they are manufacturing several automobile specialties. They commenced business several months ago, but a short time ago their factory was totally destroyed by fire. They have secured other quarters and are installing new machinery, so that they will be able to make deliveries about the first of the year.

The Gemmer Engineering & Mfg. Company, Marion, Ind., will erect new buildings that will nearly triple their present capacity, for the manufacture of gas engines. One of these buildings is to be 80 x 160 feet and the other 80 x 80 feet. The National Sweeper Company, who are using part of the present Gemmer plant, will expand into premises now occupied by the Gemmer Company upon the completion of their new buildings.

The directors of the Indianapolis & Cincinnati Traction Company have decided to enlarge the power house, at Rushville, Ind., so as to accommodate another battery of boilers. Chas. A. Henry, Indianapolis, is president.

The Public Service Company have been organized, at Plainfield, Ind., with $50,000 capital, to build an electric light and power plant, water works and steam heating plant. William Baxter Vestal is president and Sanders Hubbard secretary-treasurer of the company.

Foundries.

There is no truth in the report that the American Brake Shoe & Foundry Company are to double the capacity of their plant at Mahwah, N. J.

Because a ten per cent. reduction of wages was announced, 200 employees of the North Reading plant of the Reading Foundry Company, at Reading, Pa., have quit work. The company have a large number of orders on hand.

The Bloomfield Mfg. Company, Bloomfield, Ind., manufacturers of combination vise, anvil and drill tool grinders, have added a foundry to their plant, and are now making all their own castings as well as doing jobbing work for others.

The Seaboard Steel Casting Company, Chester, Pa., have been making very large pipe fittings for the new Philadelphia filtration plant. These pipes are 60 and 48 inches in diameter and will form part of the largest pipe line in the world. The crosses, tees and reducers for this system were ordered to be made of steel, as the best iron connections would not stand the tests required. The big pipes are a novelty in cast steel and are attracting the attention of engineering experts.

The Hockensmith Wheel & Mine Car Company, formerly located at Irwin, Pa., have built a plant at Penn, Pa., and last week commenced operations. The new plant is larger than the old and the company's business is such that it will be taxed nearly to its capacity.

A large order for cast iron columns weighing 1500 pounds each has been received by the Middletown Car Company. The company are shipping large orders of these columns to New York City, where they are being used in the erection of buildings.

The business of Findlater & Copeland, San Angelo, Texas, manufacturers of vehicles, farm implements, &c., has been incorporated as the San Angelo Mfg. Company, with a capital stock of $25,000. The new company will greatly enlarge the several departments and will erect an up to date foundry. The incorporators are John Findlater, Jr., J. R. Copeland, George Richardson and E. R. Jackson.

The plant of the American Steel Foundries, at Sharon, Pa., which was closed down last week on account of scarcity of orders, has started up again. The wage scale at this plant has not been adjusted, but the men will continue at work until an agreement is reached. The molders are being paid on the basis of $3.50 per day and have been notified of a reduction to $3.15 per day.

A test has been made at the Terre Haute Car Works, Terre Haute, Ind., of a new process of molding and casting car wheels which will largely reduce the cost. It is said to have been so satisfactory that a $20,000 plant will be installed.

Schedules in bankruptcy of the Ramapo Car Wheel Company of Hillburn, N. Y., show liabilities $83,575 and nominal assets $121,221, consisting of stock, $26,505; machinery, $35,000; accounts, $58,508; horse and wagon, $200; office furniture, $1000; cash, $8. Among the creditors are the City National Bank of Buffalo, $23,500; R. L. Ginsburg of Buffalo, $11,792; North American Trust Company, $6489, secured, and the Title Guarantee & Trust Company, $5957, secured.

The McBeth Iron Works, Cleveland, Ohio, are rebuilding their foundry, which was damaged by fire a short time ago, and they are installing considerable new equipment, including a large traveling crane. The improvements will double their former capacity and will enable them to handle castings up to 50,000 pounds.

Bridges and Buildings.

A. Y. Bayne & Co., Minneapolis, have been awarded the contract for the erection of a bridge across the Chippewa River at Cornell, Minn., the amount of the contract being $9575.

The appraisement of the Wabash Bridge & Iron Company's property, Wabash, Ind., made by the bankruptcy court is $40,600, including much raw and finished product. An offer has been made to the holders of claims aggregating $300,000 of $60,000 for the plant and machinery; $15,000 in cash and the remainder in 6 per cent. bonds, running ten years and secured by first mortgage on the plant.

The Lafayette, Ind., branch of the American Bridge Company has been handicapped by difficulty in getting raw material and by limited capacity for turning out work. The plant has been behind orders for months. Manager Charles A. Kyle has been conferring with the officers of the Western division concerning the enlargement of the factory.

Fires.

The paint works of N. Z. Graves & Co., Philadelphia, Pa., were burned December 5. The loss is about $100,000.

The wood working department of the Père Marquette shops, at Saginaw, Mich., was burned December 4. The loss is placed at $100,000.

The Bullock Electric Mfg. Company's plant, at Norwood Ohio, was recently damaged $60,000 by fire.

The Windsor Locks Machine Company, Windsor Locks, Conn., suffered a $6000 loss by fire December 3.

The F. P. Smith Wire & Iron Works, Chicago, Ill., were damaged $100,000 by fire on December 3.

The mill of the Bristol Mfg. Company, at Plainville, Conn., was damaged $25,000 by fire last week.

The extensive plant of the Smith, Myers & Schnier Company, Cincinnati, Ohio, was recently destroyed by fire. The loss is placed at $50,000.

The roundhouse and shops of the Central Railroad of Pennsylvania, near Williamsport, Pa., were destroyed by fire December 3. The loss is about $100,000.

The plant of the Reynolds Mfg. Company, West Toledo, Ohio, manufacturers of hardware specialties, was damaged by fire last week to the extent of about $3500. Insurance was $2500.

Hardware.

Contracts have been let for a new factory building for the Allith Mfg. Company, manufacturers of door hangers, Chicago, which will be built at Forty-third avenue and the Chicago Terminal tracks. The building will cost about $11,000. The factory will be fire proof and modern in every respect.

The Anchor Silverware Company are removing their plant from Muncie, Ind., to St. Paul, Minn. The effects of natural gas fumes upon the silver ware is given as the cause of their removal. A. E. Seliger is president of the company.

The Dain Mfg. Company, Ottawa, Iowa, agricultural implement manufacturers, in addition to the improvements made to their factory last year, are building a new warehouse, 100 x 200 feet. The company have also recently installed quite a lot of new machinery of modern type, giving greatly increased facilities for handling their business.

The Dowden Mfg. Company, Prairie City, Iowa, have about

completed a new foundry building, 42 x 62 feet, which will enable them to fill orders for potato diggers, sorters, &c., with greater ease than heretofore. In fact, the demand for this line of tools has been beyond the ability of the company to supply.

The Louden Machinery Company, manufacturers of hay tools, barn door hangers and hardware specialties, Fairfield, Iowa, are erecting a new office building, two stories and basement, 48 x 60 feet. The first floor will be used for office purposes exclusively, while the second floor will be occupied by the pattern department and the office of the superintendent. Modern equipment will be installed. The old office rooms of the company will be added to the shipping department, giving greatly enlarged floor space for shipping purposes.

The Anderson Company, manufacturers of farm specialties, Little Falls, Minn., have bought a site on University avenue, midway between Minneapolis and St. Paul, and will move their factory there next spring. New buildings will be erected, but machinery from the present plant will be moved and utilized. Side tracks will connect the new plant with the Minnesota Transfer Railway, which will give excellent transportation service to all of the roads entering the Twin Cities.

Moore Plow & Implement Company, manufacturers of plows, garden tools, feed cookers and other implements, Greenville, Mich., have built a large addition to their plant, and in future will be well equipped to supply the wants of the trade in their line.

The Lamb Wire Fence Company, Adrian, Mich., have made a number of additions to their plant this season and have practically doubled their capacity, having at the present time over 130,000 square feet of floor space in their shops and storage buildings and a capacity that will enable them to turn out 100 miles of fencing each day on single turn time.

The Perkins Wind Mill Company, Mishawaka, Ind., have increased their plant during the past year by the erection of a building 110 x 140 feet and five stories high. Next year they expect to increase their equipment still further.

J. A. Everitt, Indianapolis, Ind., reports that last year was a banner year in the manufacture of seed sowers, but during the present season, to date, 30 per cent. more machines have been sold than during the same time last year.

The Fleming & Sons Mfg. Company, Huntsville, Mo., have just completed the construction of a new brick building, which will be utilized as a painting, storage and shipping room. The new building will give 14,000 square feet of floor space and will greatly aid in taking care of the company's business. The company manufacture hay stackers, riding rakes, corn harvesters and similar implements.

Indiana Shovel Company, New Castle, Ind., have increased their capacity so that they are now in a position to make 300 dozen in a day of ten hours.

John E. Blake, formerly of the Avoca Mfg. Company, Avoca, N. Y., together with Messrs. Clark and Wilson, have formed the Crown Mfg. Company, Avoca. The company will continue the shear and grinding business of Clark & Wilcox, machinery being also added for the production of cordage mill specialties.

The Dwiggins Wire Fence Company, Anderson, Ind., bought the Pole & Shaft Company's plant in that city, rebuilt it entirely from brick, and are now operating a new plant for the manufacture of wire fence.

J. W. Sefton Mfg. Company, Chicago, makers of wooden and strawboard boxes and novelties, recently completed a factory building, 200 x 300 feet, and four stories high, at Anderson, Ind.

Thomas W. Wright & Sons, Anderson, Ind., have just completed a factory for the manufacture of patented "D" shovel handles. Their present capacity is 500 dozen handles per day.

The Warren Axe & Tool Company, Warren, Pa., have had an unusually busy year, and orders now on hand will keep their factory running full for the next 60 days. They have established a large trade for their Sager patent grade of axes and lumbering tools. In addition to their daily output of 1500 axes they manufacture lumber tools, including log grabs, peavies, bark spuds and others, on which they have recently secured patents.

Miscellaneous.

The Whitcomb Cabinet Company, Kansas City, Mo., purpose building a factory, which will be 83 x 100 feet, three stories and basement. Most of the machinery which will be required has already been purchased, but the company will probably still need a planer, jointer and shaper, also the latest improved glue heaters and two or three more motors. A boiler for heating purposes will also be required, and an elevator running from basement to third floor, 7 feet by 16 feet 6 inches.

G. F. Glancy and others of New York will build a modern factory at Newton, Mass. Plans are now being prepared and work will be started in the spring.

Employees of the galvanizing department of the Wheeling Corrugating Works, Wheeling, W. Va., have been notified of a reduction of 20 per cent. in wages, effective December 1. Employees of the tin house, whose wage agreement does not expire until July 15, declined to accept the cut, and it was not pressed.

The Titusville plant of the American Radiator Company, at Titusville, Pa., has resumed operations after a short shut down. The plant has been greatly hindered in its output by the building trades troubles in New York, which held up work on a large number of new buildings.

The Bristol Brass Company of Bristol, Conn., have voted to increase the capital stock from $400,000 to $500,000. The company's business has so increased as to call for this additional capital, which will probably be all subscribed for by the present stockholders. No material enlargement of the plant is planned.

The Providence Gas Company, Providence, R. I., are to build a gasometer which, it is said, will be the largest in New England.

The International Fire Engine Company, New York, intend to move their Cincinnati plant to Seneca Falls, N. Y., and combine it with the plant at the latter place.

The Reliance Motor Cycle Company, Addison, N. Y., recently incorporated, are having their motor cycles manufactured in the plant of the Empire State Cycle Company.

The Dunbar Furnace Company, Dunbar, Pa., have completed the building of 60 new Semet-Solvay by-product coke ovens, and 50 of these have been started. This company now have a total of 110 Semet-Solvay ovens at their furnace plant.

The Anderson Bolt Works, Anderson, Ind., has been sold to the Silo Mfg. Company of that city, to be used in the manufacture of silos. W. M. Swain, E. M. Wilson and J. L. Hill are the directors of the company.

Because of the similiarity of names an error was made in these columns November 5 in stating that the Toquet Launch & Motor Company, Saugatuck, Conn., had incorporated for the manufacture of automobiles. It was the Toquet Motor Car & Construction Company, also at Saugatuck, who were incorporated for that purpose. They are now having constructed a demonstrating automobile, and for the present will have all work done by contract. The motor car company are a New York corporation, whereas the launch company are a Connecticut corporation, and the two are entirely independent of each other.

L. K. Davis of the United States Sand Filtration Company, Indianapolis, Ind., has closed the contract for installing a new filtration plant for the Wilmington, Del., municipal water works. The price as given by Mr. Davis is about $1,200,000. The company also have a $1,000,000 contract for a filtration plant at Washington, D. C.

William F. Oesterle, Marion, Ind., chemist for the Oliver Iron Mining Company of Minnesota, and O. W. Brown, A.M., of the University of Indiana, Bloomington, Ind., claim to have discovered a process that may revolutionize the zinc industry. They have been granted a patent which involves a specially devised furnace in which the ore is charged with electricity. It is estimated that with the use of this process four men will be able to do the work now requiring the services of 100 men. It is stated that a plant will be built either at Marion or at Indianapolis.

The Gedge Brothers' Iron Roofing Company, Anderson, Ind., have added a new brick factory to their plant this year, and are taking up the manufacture of galvanized iron tanks and other receptacles in addition to their old line of roofing.

The American Shipbuilding Company of Cleveland have taken a contract for the largest vessel ever constructed on the great lakes. The vessel will be 560 feet long, 56 feet beam and 32 feet deep, and will have a capacity of 14,000 tons of freight or ore. The vessel will have a special hopper construction of the hold, which will make it possible for her to take on a full cargo of ore in one hour and unload it in five hours. At present the largest vessels on the great lakes are 498 feet long, and the largest cargo on record was that of the "Edenborn," one of this type, which recently unloaded 9864 tons of ore at South Chicago. The vessel will be built for A. B. Wolvin of Duluth, and will cost $470,000, which is more than double the cost of vessels that were considered large a few years ago. G. A. Tomlinson of Duluth has contracted for a vessel 498 feet long, 52 feet beam and 29 feet deep. She will have 28 hatches to facilitate the work of handling the cargo. She will cost about $350,000, and will be built at Lorain in a berth adjoining the Wolvin steamer.

Andrew Wheeler, Jr., of Philadelphia has consented to act as treasurer of the American Iron and Steel Association, his father, the late Andrew Wheeler, having filled that office for more than 20 years.

The Iron and Metal Trades.

Our monthly blast furnace statistics show how heavily the closing down of blast furnaces has told on the production which in November, including Charcoal Iron, fell to 1,074,000 tons as compared with an average of nearly 1,600,000 tons during the months of July, August and September. Such a drop within the short space of two months is altogether unprecedented in the American Iron industry. Yet the productive capacity working on December 1 was lower still than on November 1, the capacity of all the furnaces in the country declining from 282,219 gross tons per week on November 1 to 251,181 tons on December 1, thus foreshadowing a further falling off.

That these heroic measures were necessary is proven by the fact that even with so sharp a falling off the stocks in the hands of reporting merchant furnaces increased from 597,399 tons on November 1 to 658,107 tons on December 1. An analysis of the returns shows that this increase is distributed all over the country. This is not surprising in the case of the Northern furnaces, who were being sharply undersold by the Southern producers, but it is somewhat perplexing that there was an increase also in the stocks of the latter. The only explanation is that the supplies in consumers' hands must be down to the lowest limit, to which the constant pressure of buyers to secure immediate delivery clearly points. On the other hand a partial report of the Steel works' stocks shows a falling off of about 45,000 tons during November.

Reports from all the principal distributing centers show a better feeling in the Pig Iron markets. A very high tonnage of Southern Pig Iron has been sold, a good deal of it earlier in the week, on older options at $9. Since then the leading makers have successively advanced prices to $9.25 and to $9.50 at Birmingham for No. 2, and it is only a few smaller makers who name the former price, which may be withdrawn at any moment. Some of the Northern makers have stiffened up, but on the whole they maintain their former attitude, strengthened in it by the fact that the disparity in the price between the iron of the two sections is lessened.

There is a little more interest in Bessemer Pig in the Central West and quite some movement in Basic Pig in the East, where it is selling at $13.75 and $14 delivered, except in a few localities, where $13.50 can be done owing to favorable freight rates.

About ten days since the leading Southern interest booked an order for 6000 tons of Pig Iron for shipment to England, the largest transaction of the kind made thus far. Further business on the same basis has been declined, however.

The meeting next week of the Billet pool and of the makers of Plates and Steel Bars naturally makes the market quiet in these branches. The general complaint is that new work is coming in slowly in the majority of lines. This, however, may be misleading, since buyers are evidently holding back to await developments, while many manufacturers and merchants purchase sparingly, with the question of inventories so near at hand.

Still, there is a little better feeling since, notably in Structural Material; inquiries are coming in which show a greater activity in the building trades.

A Comparison of Prices.

Advances Over the Previous Month in Heavy Type, Declines in Italics.

At date, one week, one month and one year previous.

	Dec.10, 1903.	Dec. 3, 1903.	Nov.11, 1903.	Dec.10. 1902.
PIG IRON:				
Foundry Pig No. 2, Standard, Philadelphia	*$15.00*	$15.00	$14.50	$23.00
Foundry Pig No. 2, Southern, Cincinnati	12.00	12.00	12.25	22.25
Foundry Pig No. 2, Local, Chicago	*14.25*	14.50	14.50	23.00
Bessemer Pig, Pittsburgh	*14.60*	14.85	15.10	22.00
Gray Forge, Pittsburgh	*12.50*	12.50	13.00	20.75
Lake Superior Charcoal, Chicago	*16.50*	16.50	17.00	25.00
BILLETS, RAILS, &c.:				
Steel Billets, Pittsburgh	23.00	23.00	23.00	29.50
Steel Billets, Philadelphia	*24.25*	24.25	25.00	27.50
Steel Billets, Chicago	24.00	23.00	24.00	29.50
Wire Rods, Pittsburgh	31.00	31.00	31.00	34.50
Steel Rails, Heavy, Eastern Mill	28.00	28.00	28.00	28.00
OLD MATERIAL:				
O. Steel Rails, Chicago	*10.75*	9.00	12.50	18.75
O. Steel Rails, Philadelphia	*11.75*	11.75	12.25	21.00
O. Iron Rails, Chicago	*13.00*	13.00	17.00	24.00
O. Iron Rails, Philadelphia	*16.00*	16.00	16.50	23.50
O. Car Wheels, Chicago	*13.00*	13.00	17.00	24.00
O. Car Wheels, Philadelphia	*12.75*	12.75	15.00	20.00
Heavy Steel Scrap, Pittsburgh	*11.00*	12.00	14.00	21.00
Heavy Steel Scrap, Chicago	*9.00*	9.00	12.00	18.25
FINISHED IRON AND STEEL:				
Refined Iron Bars, Philadelphia	*1.35*	1.35	1.40	1.92½
Common Iron Bars, Chicago	*1.35*	1.35	1.40	1.75
Common Iron Bars, Pittsburgh	1.34¾	1.34¾	1.30	1.70
Steel Bars, Tidewater	1.44½	1.44½	1.42½	1.75
Steel Bars, Pittsburgh	1.30	1.30	1.30	1.60
Tank Plates, Tidewater	1.78	1.78	1.78	2.10
Tank Plates, Pittsburgh	1.60	1.60	1.60	1.85
Beams, Tidewater	1.73½	1.73½	1.73½	2.00
Beams, Pittsburgh	1.60	1.60	1.60	2.00
Angles, Tidewater	1.73½	1.73½	1.73½	2.00
Angles, Pittsburgh	1.60	1.60	1.60	1.95
Skelp, Grooved Iron, Pittsburgh	*1.45*	1.45	1.35	1.90
Skelp, Sheared Iron, Pittsburgh	*1.55*	1.55	1.45	2.00
Sheets, No. 27, Pittsburgh	*2.30*	2.30	2.40	2.65
Barb Wire, f.o.b. Pittsburgh	*2.50*	2.50	2.60	2.45
Wire Nails, f.o.b. Pittsburgh	*1.90*	1.90	2.00	1.85
Cut Nails, f.o.b. Pittsburgh	1.90	1.90	1.90	2.05
METALS:				
Copper, New York	*12.25*	12.12½	13.50	11.65
Spelter, St. Louis	*4.60*	4.50	5.25	4.60
Lead, New York	*4.10*	4.10	4.40	4.10
Lead, St. Louis	*4.02½*	4.00	4.20	3.97½
Tin, New York	**27.00**	25.80	25.00	24.85
Antimony, Hallett, New York	6.25	6.25	6.25	7.12½
Nickel, New York	40.00	40.00	40.00	40.00
Tin Plate, Domestic, Bessemer, 100 pounds, New York	3.79	3.79	3.79	3.79

Chicago.

FISHER BUILDING, December 9, 1903.—(*By Telegraph.*)

The new strength developed among the producers of Southern Pig Iron is serving to stiffen the backbone of the market on nearly all Finished Iron and Steel products. Even Old Materials have been checked in their rapid descent. A majority of Southern Pig Iron interests here insist that the minimum price on No. 2 Southern is $9.50, at Birmingham, or $13.35, Chicago, and the three largest producers, flanked by many smaller ones, are refusing to take business at less than that price. A few smaller furnaces that have not yet turned a sufficient percentage of their surplus into cash to feel comfortable still quote $9.25, Birmingham, or $13.10, Chicago, but couple this quotation with the statement that it is for immediate acceptance only. Some furnaces have instructed their representatives here to take nothing less than $13.85, Chicago, for No. 2 Southern. No. 4 Southern Coke, Basic and Foundry Forge have all been advanced 25c. In Northern Irons one producer has reduced his price 25c., making the minimum $14.25, Chicago, for No. 2. This is in anticipation of the lower prices at which they will be able to buy Coke after January 1, at which date their high priced contract expires. Other producers claim that the saving in Coke has already been more than anticipated in their present minimum price of $14.50, Chicago, for No. T Northern. Bar Steel and Iron show no change from last week, being quoted at 1.46½c., base, Chicago, for Steel, in car lots, and 1.35c. to 1.40c., base, on Iron. Plates are quiet and inactive at 1.75c., base, Chicago. Structurals from mill show only a fair activity at 1.76½c., Chicago. The official discounts on Boiler Tubes remain the same as they have been for many weeks, though competition

by independent mills is doubtless met with sufficient deductions to secure the business. Billets remain at $24, Chicago, and Standard Section Rails at $28, with business light in both lines. Merchant Steel has settled down to routine specifications on contracts at the new prices promulgated at the time Bars were reduced. Old Materials show a comparative strength, though slight reductions are made in some items. Keen competition among many Coke producers is leading to a softening in prices. While Frick Coke is quoted at $2.65, at the ovens, or $5.30, Chicago, other high grade Cokes are offered freely at from 15c. to 20c. lower.

Pig Iron.—The strength and activity noted in last week's market are even more pronounced this week The three largest producers in the Alabama territory are announcing to their trade that $9.50, Birmingham, or $13.35, Chicago, is their minimum price for No. 2 Southern Foundry Iron. There are still a few smaller furnaces that are willing to take $9.25 to-day, but it is not certain that they will continue to make this price any length of time. While we still quote $13.10, Chicago, as our minimum in the schedule below, it is much more firmly the bottom price than it was last week. No. 4 and Foundry Forge are advanced to $12.35, Gray Forge to $12.10 and Southern Basic to $13.45, in each an increase of 25c. per ton over last week's quotation. A lot of 2000 tons of Basic was sold to a local consumer at a price that would figure about $9.40 at the furnace, though the producer announced that not a pound would be sold hereafter at less than $9.50, Birmingham. A number of Southern furnaces have wired their Chicago representatives to sell no Iron for 1904 delivery at less than $10 per ton for No. 2 at Birmingham, while other furnaces are taking business at $9.50, Birmingham, for the first quarter and refusing to quote beyond that. Northern Iron has been reduced by one interest 25c. a ton, in anticipation of the readjustment of costs in 1904 after the present high priced Coke contracts expire. This brings the two Irons more nearly to their wonted relationship, although Southern is still low compared with Northern in the Chicago market. The following are the prices in carload lots at Chicago, the lower prices representing quotations on large contracts for delivery within the next 60 days and the higher prices representing single carload lots for prompt delivery or contracts extending into the spring:

Lake Superior Charcoal	$16.50 to $17.00
Northern Coke Foundry, No. 1	14.75 to 15.25
Northern Coke Foundry, No. 2	14.25 to 14.75
Northern Coke Foundry, No. 3	14.00 to 14.50
Northern Scotch, No. 1	15.50 to 16.00
Ohio Strong Softeners, No. 1	16.80 to 17.30
Ohio Strong Softeners, No. 2	16.30 to 16.80
Southern Silvery, according to Silicon	14.60 to 15.10
Southern Coke, No. 1	13.60 to 14.10
Southern Coke, No. 2	13.10 to 13.60
Southern Coke, No. 3	12.60 to 13.10
Southern Coke, No. 4	12.35 to 12.85
Southern Coke, No. 1 Soft	13.60 to 14.10
Southern Coke, No. 2 Soft	13.10 to 13.60
Foundry Forge	12.35 to 12.85
Southern Gray Forge	12.10 to 12.60
Southern Mottled	12.10 to 12.60
Alabama and Georgia Car Wheel	20.85 to 21.85
Malleable Bessemer	14.50 to 15.00
Standard Bessemer	16.30 to 16.80
Jackson County and Kentucky Silvery, 6 to 10 per cent. Silicon	18.30 to 19.30
Basic Southern	13.35 to 13.60

Bars.—Bar Iron may be said to be weak, at 1.35c. to 1.40c. in car lots, Chicago, and less than car lots sell at 1.40c., without extra charge for quantity, but in either case the ordinary extras for less than a ton of a size prevail. Bar Steel and Steel Bands show considerable strength at 1.46½c., Chicago, in car lots, with half extras on Bars smaller than base and quarter extras on large rounds and squares. Buyers have apparently accepted this price as being the lowest they will have quoted them for some time and are not altogether confining their specifications to immediate needs. Steel Hoops, while officially quoted at 1.81½c. rates in 250-ton lots and 1.91½c. rates in car lots or less than 250-ton lots, are being offered at the lower price named for car lots. In less than car lots the official price is 2.01½c. per 100 lbs. From store Steel Bars are selling at 1.65c. to 1.75c., with occasional sales to large customers at 1.60c. Iron Bars from store are measurably firm at 1.75c., base, full extras, though it is understood 1.60c. and 1.65c. are quoted when necessary to compete with Steel. Hoops from store go at 2.10c. to 2.25c.

Structural Material.—No change in prices is noted, and inquiries are fairly active. Large office buildings in Chicago, aggregating over 5000 tons of Steel, are either open for bids or on the way. The leading interest charge full base prices for Steel and full extras for shop work when figuring on completed buildings, while independent interests are shading the extras on shop work in order to keep their organizations intact. Producers of Structurals insist that a reduction in prices is almost out of the question, and that if any commodity in the market will retain its present figures it will be the Structural Steel Shape. Based on 1.60c., Pittsburgh, Structural Steel at Chicago is 1.76½c. for I-Beams and Channels, 15 inches and under, and Angles, 3 inches on one leg and larger, with the regular 5c. extra for Tees 3 inches and larger. Warehousemen are now refusing to quote the former price of 1.90c. on Structural, cut to 5 feet and over, except on desirable specifications, holding at 2c. on small lots.

Plates.—Rumors of cuts in prices on Plates, when traced down, develop the fact that mills that are making Open Hearth Steel Plate exclusively make known to their customers the fact that their Tank Steel is identical in its chemical analysis, structure and method of manufacture with their Flange Steel, giving the customer the opportunity of buying what is actually Flange quality at the Tank price, though marked and billed as Tank Steel. The market is anything but active, though, perhaps, not quite as torpid as it was two or three weeks ago. The official prices remain unchanged, as follows: Tank Steel, ¼ inch and heavier, 1.75c. to 2c.; Flange, 1.85c. to 2.15c.; Marine, 1.95c. to 2.10c.; Universal Mill Plates, 1.75c. to 2c. Sales from store are larger in quantity and more numerous than for some weeks. We quote at 2c. for ¼ inch and heavier, 2.10c. for 3-16 inch and 2.15c. for No. 8, with 25c. extra for Flange quality.

Cast Iron Pipe.—Considerable demand for Cast Pipe for the Pacific Coast and the Philippine Islands is in evidence, and it is a novel fact that the railroads are naming a freight rate to Manila $2 per ton less than to San Francisco. For the local trade, in ordinary lots we name a reduction of $1 per ton below prices quoted last week, while on large tonnages there is no telling how low the mills would go. We quote: Four-inch, $27.50 to $28; 6-inch, $26.50 to $27, in carload lots, for Water, and $1 per ton higher for Gas Pipe.

Merchant Pipe.—No change has been made in the prices of Merchant Pipe by the leading producer. Business is dull, but not more so than should be expected under the general conditions of weather and industrial operations. We quote:

	Steel Pipe,		Guaranteed Wrought Iron.	
	Black.	Galvd.	Black.	Galvd.
	Per cent.	Per cent.	Per cent.	Per cent.
⅛ to ⅜ inch	66.35	56.35	63.35	53.35
½ inch	68.35	58.35	65.35	55.35
¾ to 6 inches	73.35	63.35	70.35	60.35
7 to 12 inches	67.35	57.35	64.35	54.35

Less than carloads, 12½ per cent. advance.

Boiler Tubes.—While official prices remain the same, any buyer who is in the market for any considerable quantity of Boiler Tubes can secure from 2½ to 3½ per cent. better discounts than those named below on Steel Tubes and 5 to 8 per cent. better discount on Charcoal Iron Tubes. These lower quotations are being made by independent mills, while the following are the official quotations named by the leading producers:

	Discounts, per cent.		
	Steel.	Iron.	Seamless steel.
1 to 1½ inches	40.85	37.35	53.35
1¾ to 2½ inches	53.85	36.35	40.35
2¾ to 5 inches	59.35	46.35	up to 4 in. 48.35
6 inches and larger	53.85	36.35	....

Warehousemen report that business on Boiler Tubes from store is unusually active, and that indications point to the fact that the boiler shops are busier than they have been for the past two months. The following agreed store prices are being maintained:

	Steel.	Iron.	Seamless steel.
1 to 1½ inches	40	35	37½
1¾ to 2½ inches	50	32½	35
2¾ to 5 inches	57½	42½	45
6 inches and larger	50	32½	..

Sheets.—The market on Sheet Steel is still sagging and no two producers agree on prices. No. 28 gauge is offered in carload lots, Chicago, at 2.55c. by a Western mill, with 1.85c. for No. 10. Prices at Chicago on Sheets from Pittsburgh mills in carload lots range about as follows: No. 10, 1.96½c. to 2.01½c.; No. 12, 2.01½c. to 2.06½c.; No. 14, 2.06½c. to 2.11½c.; No. 16, 2.16½c. to 2.21½c.; Nos. 18 and 20, 2.21½c. to 2.31½c.; Nos. 22 and 24, 2.31½c. to 2.41½c.; No. 26, 2.41½c. to 2.46½c.; No. 27, 2.46½c. to 2.51½c.; No. 28, 2.56½c. to 2.61½c. Less than carload lots are offered at from 5c. to 10c. above these figures, depending upon character of specifications. Large warehousemen are endeavoring to maintain last week's prices from store, though concessions are made when necessary to protect their customers. Quotations remain nominally unchanged, as follows: No. 10, 2.15c. to 2.25c.; No. 12, 2.25c. to 2.35c.; No. 14, 2.35c. to 2.45c.; No. 16, 2.45c. to 2.55c.; No. 18, 2.50c. to 2.60c.; No. 20, 2.55c. to 2.65c.; No. 22, 2.60c. to 2.70c.; No. 24, 2.70c. to 2.80c.; Nos. 25 and 26, 2.80c. to 2.90c.; No. 27, 2.90c. to 3c.; No. 28, 3c to 3.10c.; No. 29, 3.10c. to 3.20c.; No. 30, 3.25c. to 3.35c. Galvanized Sheets have dropped to 75, 10 and 5 discount, Chicago, in carload lots from mill, and at 75 and 7½ in less than carload lots from store.

Billets.—Billets, whether for forging or rolling purposes and whether Open Hearth or Bessemer, are offered by association interests at $24, Chicago, in carload lots, with an increase of 50c. to $1 per ton for less than carload lots.

Rails and Track Supplies.—Standard Section Rails are still officially quoted at $28 per ton, while Light Sections are sold at whatever price will take the business. Rails weighing 16 lbs. to the yard are being offered from stock, Chicago, at the basis of 1.60c. per 100 lbs., with 5c. advance for 12-lb. and 15c. advance for 8-lb. Sections. Sections weighing 20 to 25 and 30 lbs. are sold at Chicago, from mill, at 1.55c. Track Supplies are frequently sold with Standard Sections at a nominal figure, or, in other words, as a sort of premium to the buyer; but where sold separately in car lots prices range about as follows: Angle Bars, 1.50c. to 1.60c.; Spikes, 1.85c. to 1.90c., base; Track Bolts, Square Nuts, 2.55c. to 2.65c., base, with 10c. to 15c. advance for Hexagon Nuts.

Merchant Steel.—Business continues quiet in this line, though the implement manufacturers are specifying with a fair degree of activity. Prices remain unchanged, as follows: Open Hearth Spring Steel to the general trade, 2c. to 2.25c.; Smooth Finished Machinery Steel, 1.71½c. to 1.81½c.; Smooth Finished Tire, 1.66½c. to 1.76½c.; Sleigh Shoe, 1.51½c. to 1.61½c.; Cutter Shoe, 2.25c. to 2.35c.; Crucible Tool Steel, 6½c. to 8c.; Special Tool Steel, 12c. up; Shafting at 52 per cent. in car lots and 47 per cent. in less than car lots; Toe Calk Steel, 2.01½c. to 2.11½c.

Old Material.—The firmness that developed last week in Old Material continues in all but a few lines, and while there are no actual advances in prices, the general sentiment seems to be that the bottom has been reached and the next move will be upward. It is true that buying cannot be called active, but sellers are not nearly as anxious to dispose of their holdings as they were some weeks ago. Approximate quotations are as follows, per gross ton, f.o.b. cars, Chicago:

Old Iron Rails	$13.00 to $14.00
Old Steel Rails, 4 feet and over	10.75 to 11.25
Old Steel Rails, long lengths	10.50 to 11.00
Heavy Relaying Rails, subject to inspection	22.50 to 23.50
Heavy Relaying Rails, for side tracks	18.00 to 20.00
Old Car Wheels	13.00 to 14.00
Heavy Melting Steel Scrap	9.00 to 10.00
Mixed Steel	8.00 to 9.00

The following quotations are per net ton:

Iron Fish Plates	$11.00 to $11.50
Iron Car Axles	14.00 to 14.50
Steel Car Axles	13.00 to 13.50
No. 1 Railroad Wrought	10.00 to 10.50
No. 2 Railroad Wrought	9.00 to 9.50
Shafting	13.00 to 13.50
No. 1 Dealers' Forge	8.75 to 9.00
No. 1 Busheling and Wrought Pipe	8.00 to 8.50
Iron Axle Turnings	7.00 to 7.50
Soft Steel Axle Turnings	6.50 to 7.00
Machine Shop Turnings	6.50 to 7.00
Cast Borings	3.25 to 3.50
Mixed Borings, &c.	3.25 to 3.50
No. 1 Boilers, cut	8.50 to 9.00
Heavy Cast Scrap	11.00 to 11.50
Stove Plate and Light Cast Scrap	8.50 to 9.00
Railroad Malleable	9.00 to 10.00
Agricultural Malleable	8.00 to 9.00

Metals.—Every item on the Metal list, with the exception of Pig Tin, is weak. Casting Copper is offered at 12⅛c. to 12½c.; Lake at 12¼c. to 12¾c., Chicago; Lead, 50-ton lots, 4.05c.; car lots, 4.10c.; less than car lots, 4.25c. to 4.35c.; Spelter has declined to 4¾c. in car lots, in less than car lots 5c.; Sheet Zinc at Lasalle has been reduced 5 per cent.; Pig Tin is stronger, selling in car lots at 27½c. and in less than car lots at 27¾c. Old Metals are unchanged, Heavy Cut Copper selling at 10¼c., Copper Bottoms at 9½c., Red Brass at 9½c., Lead at 3.85c., and Zinc at 3.62½c., spot.

Tin Plate.—The shortage in fruit and vegetable crops in the West is responsible for a great diminution in the demand for Tin Plate in this market. Prime Bessemer Coke Tin is officially quoted at $3.79, base, Chicago, for boxes of 112 sheets, 14 x 20, with the usual extras.

Coke.—This market continues weak, and while the representatives of the Frick ovens insist that they are maintaining the price of $2.65 at the ovens, or $5.30, Chicago, in car lots, other Cokes that are equally high in popular favor, as, for instance, Hostetter and the Rainey, are being offered at 10c. to 20c. per ton lower, and some Connellsville Cokes are being offered in this market as low as $4.90 to $5. It is stated, however, by the representative firms that Coke delivered at $5 and less will prove to be Furnace rather than Foundry grade. Pocahontas and New River grades are quoted as low as $4.90, Chicago, in car lots.

F. E. Pfanmueller & Co., Chicago, dealers in second-hand gas engines, machinery and tools, have moved into new and larger quarters at 177 to 181 East Division street, where they will have the advantage of ample power for operating and testing machinery. Mr. Pfanmueller was formerly purchasing agent for the Chicago House Wrecking Company.

Philadelphia.

FORREST BUILDING, December 8, 1903.

There is no material change in the situation except that the Pig Iron end of the market looks very well, but it is curious that this is not reflected in other departments, as there are very few instances in which improvement can be noted apart from Pig Iron. Buying of that article, however, has been on a very large scale, and may be an indication of other good things that are to come. Be this as it may, we can only state the facts and leave others to draw their own conclusions. It is a long time since it was as difficult to size up the situation as it is to-day, but it will straighten itself out before long. Business is going to be either better or worse, and if Pig Iron is to be recognized as the starting point, as it usually is, it should mean improvement along the entire line. On the other hand, there is no evidence of any increase in the demand for finished products, and if they fail to connect, the Pig Iron movement will not make much headway. The results of careful inquiries in this territory fail to confirm or to conform to the Pig Iron situation, and suggests a close analysis of the latter. In the first place it appears that very large quantities of Southern Iron have been placed at prices from $9 to $9.25, f.o.b. cars, for No. 2 X Foundry. These large sales stiffened the market considerably, although for January and February shipments $9.25 is still an open quotation. Northern furnaces, as well as those in the West, owing to curtailment of output have also bettered their position, so that a point has been reached at which concessions in prices are not considered. This, of course, indicates an approximate equality between supply and demand, and if this continues, makers of Pig Iron must get better prices, or a reduced cost of production, as there is no money in the business under present conditions. The next few weeks will therefore be an interesting period, as changes of some kind are inevitable, the probability being that it will be in reduced costs. The feeling in regard to Pig Iron would be very much stronger if there was a better demand for finished products, but it would not be in accordance with facts to say that business is satisfactory in any of the more advanced products. Stove founders have had an excellent run of business, and Pipe founders have splendid prospects; but nearly all other lines report a gradual thinning out in their order books, with no definite prospects of improvement in the near future. Taking a comprehensive view of the situation, therefore, it may be said that the Pig Iron situation is strong and healthy, while all others, with the exceptions noted, are inactive and uncertain. Pig Iron, however, is strong, not because of natural conditions, but as the result of an output curtailed to the extent of 30 to 40 per cent. by agreement among producers. Sentiment is much improved, however, and there is a disposition to prepare for renewed activity early in the new year. The talk of new work in the shipyards and in connection with the Panama Canal finds many believers, and on the whole the feeling in regard to the future is much better than it was a month ago.

Pig Iron.—The volume of business during the week has been quite large, and in most cases at very firm prices. The demand was of a widely distributed character and included almost all classes of consumers, although Steel makers have been less in evidence than was the case during the earlier months of the year. Still, from whatever standpoint the situation may be regarded, buying has been of a good character, and gives an air of probability to the belief that a better market will be met with in the near future. Prices may not be higher, but if they are not costs must be reduced, as there is a distinct loss on every tone of Iron sold at to-day's prices and business cannot be continued on a basis of that kind. The impression prevails that whatever betterment may be secured by makers of Pig Iron must come from reduced costs, as current prices in the open market are as high as they ought to be for safety and permanency. There is considerable disparity, however, between prices of Southern and Pennsylvania Irons, the former being available at $13.25 for rail shipments, while the latter range from $15 to $15.50 for deliveries at equivalent points. A large proportion of the recent sales have been of Southern brands, otherwise Northern makes would have sold at considerably higher figures, as furnaces are pretty well sold up for January and February and have only very light stocks in their yards. The chances, therefore, appear to be favorable for a good, healthy market at to-day's prices, which are about as follows for Philadelphia and nearby deliveries:

No. 1 X Foundry	$16.00 to $16.50
No. 2 X Foundry	15.00 to 15.50
No. 2 Plain	14.25 to 14.75
Southern No. 2, rail shipment	13.25 to 13.50
Southern No. 2, on dock	12.75 to 13.00
Standard Gray Forge	13.75 to 14.25
Ordinary Gray Forge	12.75 to 13.25
Basic	13.75 to 14.00

Steel.—There is a pretty good demand for small lots, but the aggregate tonnage is not large. Some business is held in abeyance pending the meeting of Billet manufacturers next week, but there is no reason for supposing that it will

make much difference whether prices are changed or not. If the material is wanted it will be taken, a dollar or two difference in price being of no great importance if the business is there. To-day's quotations remain at $24.25 to $25, delivered, according to quantity and specifications.

Plates.—Business shows no improvement, although it is said that some good sized lots are held in abeyance pending some decision in regard to prices, which report says are to be considered next week. Opinions vary in regard to this matter, the only definite thing being that for the present the following quotations are well maintained:

	Carloads. Per pound. Cents.	Part carloads. Per pound. Cents.
Tank Steel, ¼ inch and heavier	1.75	1.80
Tank Steel, 3-16 inch	1.85	1.90
Tank Steel, No. 8	1.90	1.95
Tank Steel, No. 9 and No. 10	2.00	2.05
Flange or Boiler Steel	1.85	1.90
Marine and Commercial Fire Box Steel	1.95	2.00
Still Bottom Steel	2.05	2.10
Locomotive Fire Box Steel	2.25	2.30
Plates over 100 to 110 inches wide	$0.05 per lb. extra.	
Plates over 110 to 115 inches wide	.10 "	"
Plates over 115 to 120 inches wide	.15 "	"
Plates over 120 to 125 inches wide	.25 "	"
Plates over 125 to 130 inches wide	.50 "	"
Plates over 130 inches wide	1.00 "	"
Sketches	.10 "	"
Complete circles	.20 "	"

Structural Material.—The demand is fair, and a good average business has been done during the past few days. A new building for the J. B. Stetson Company will require about 1000 tons, and one or two local jobs will require a similar quantity, but there is nothing heavy in sight at the present time. After the turn of the year an improved demand is expected, as a good deal of held up work will probably be resumed if nothing unforeseen occurs. There is some talk of a revision of prices, but for the present they are unchanged —viz.: 1.73½c. to 1.85c. for Beams, Channels and Angles, according to specifications; small Angles, 1.45c. to 1.50c.

Bars.—There is some demand for Bars, but prices are very irregular, Iron Bars being quoted from 1.30c. up to 1.45c. There is, of course, a difference in the character of the orders, as well as a difference in the Iron, all of which needs to be taken into consideration in trying to arrive at the condition of the market. Mills are badly in want of orders, although there is no money in the business at current quotations. A fair average price on the general run of carload orders would be about 1.40c., delivered, for Refined Iron and 1.43½c. to 1.50c. for Steel.

Sheets.—The demand keeps up fairly well in a dragging sort of way and mills manage to run moderately full, but the situation is anything but satisfactory. There are inquiries for good sized lots, but whether it will result in business or not is a little uncertain, but small buying is pretty good.

Old Material.—There is more demand for some descriptions and sales are more easily made, but prices are still pretty well down to the lowest figures. Bids and offers for deliveries in buyers' yards are about as follows:

Old Steel Rails	$11.75 to $12.00
Heavy Steel Scrap	11.50 to 12.00
Low Phosphorus Scrap, nominal	18.00 to 20.00
Old Steel Axles	14.00 to 15.00
Old Iron Rails	16.00 to 16.50
Old Iron Axles	15.50 to 16.00
Old Car Wheels	12.75 to 13.50
Choice Scrap, R. R. No. 1 Wrought	14.50 to 15.50
Country Scrap	12.00 to 13.00
Machinery Scrap	12.50 to 13.00
No. 2 Light Scrap	11.00 to 11.50
No. 2 Light (Ordinary)	9.00 to 9.50
Wrought Turnings	9.50 to 10.00
Wrought Turnings, Choice Heavy	10.00 to 10.50
Cast Borings	6.75 to 7.25
Stove Plate	9.50 to 10.00
Wrought Iron Pipe	10.00 to 10.50

J. K. Dimmick & Co. have moved their offices to 2022, 2023 and 2024 in the Land Titles Building, Broad and Chestnut streets. This, besides giving them more room, will place them in the new center of the Iron and Steel trade in this city.

St. Louis.

CHEMICAL BUILDING, December 9, 1903.—(*By Telegraph.*)

Pig Iron.—It seems to be the impression that the turn has come and that Pig Iron conditions have reached a steadier basis that will undoubtedly hold good. It is said that the larger Southern interests are not now bidding in this market for business covering delivery beyond the first four or five months at lower basis than $9.50, Birmingham, for No. 2 Foundry, although quite some Iron has been cleared up the past ten days 25c. to 50c. lower; but as far as can be learned these bottom prices have now practically been withdrawn. When reference is made to current inquiries, it is held that the improvement is sufficient to warrant the impression of a volume of buying of considerable extent after January 1. We quote, f.o.b. St. Louis, as follows:

Southern, No. 1 Foundry	$13.25 to $13.50
Southern, No. 2 Foundry	12.75 to 13.00
Southern, No. 3 Foundry	12.25 to 12.50
Southern, No. 4 Foundry	11.75 to 12.00
No. 1 Soft	13.25 to 13.50
No. 2 Soft	12.75 to 13.00
Gray Forge	11.25 to 11.50
Southern Car Wheel	21.00 to 21.25

Bars.—The jobbing trade are getting 1.80c., in lots from store, for both Iron and Steel Bars, and, judging from comment, the actual volume of sales and inquiry are a small factor.

Angles and Channels.—Measured by the amount of demand and inquiry at this time coming to the jobbers, buyers are taking but slight interest in this class of supplies. In lots from store 2.10c. is quoted.

Rails and Track Supplies.—Apparently the buying movement is not of an extended order at this time, and prices are essentially the same as recently reported. We quote as follows: Angle Bars, 1.95c. to 2.05c.; Bolts, with Square Nuts, 2.80c. to 2.90c.; with Hexagon Nuts, 2.95c. to 3.05c.; Spikes, 2.05c. to 2.15c.

Pig Lead.—The market is inclined to show a firmer tendency, but actual sales are still limited. Nominally 4.02½c. for Missouri brands and Desilverized at 4.05c.

Spelter.—The market is said to be fairly steady around the present level, but the extent of the buying is not large and the price is nominally 4.60c.

Cleveland.

CLEVELAND, OHIO, December 8, 1903.

Iron Ore.—The last shipments of Iron Ore from the head of the lakes were made last Saturday. Some cargoes had been delayed by the cold weather, and were started down the lakes just inside the limit of time when boats can carry insurance. All of the material was moved by contract tonnage. The unusual feature of the Iron Ore trade is that the season, which has just closed, has been, from opening to end, without a single change of carrying charges on wild boats. It is true that the first few cargoes were carried at wild rates even with the current rates, but the market sagged off 5c. on a ton, the wild rates holding on the lower level throughout the year. The fact that enough Ore has been brought down the lakes to last the Steel Corporation until August 1 is evidence enough that the tonnage at those even rates has been sufficient for all the needs. The Iron Ore producers are talking, in a casual manner, about Ore prices, but the backward Pig Iron market may prevent any action for some time. Preliminary meetings, however, will begin soon.

Pig Iron.—The situation in the Iron trade is very much better. The buying movement, which started in last Thursday and Friday, is reported better than it has been at any time in four months or even longer. In some ways it looks like a spurt or a coincidence, and yet the undertone has been steady, and the indications of a revival are not altogether absent. The buying has been about evenly distributed between demands for immediate shipment and the covering of possible future needs. It is also about evenly distributed between Northern and Southern furnaces, the former getting the better of it, if anything. The Southern situation is much stronger, some of the furnaces in that territory having sent instructions to their representatives here to hold for $10, Birmingham, for No. 2, and accept nothing else. The $9 Iron has disappeared altogether, and the sales accepted at $9.25 are fewer than they have been, with an increased tendency to hold for $9.50. In most instances the furnaces which have been selling at the lower prices have refused to contract for any considerable period ahead, as orders at present prices do not seem at all attractive. The tendency of the Southern producers to stiffen prices has given better strength to the Northern situation, While prices have not advanced, they have become more firm on the old basis. The ordering during the past week has come from the smaller foundries, which have been covering their possible needs for some time. On Saturday one sale of 1000 tons was made for delivery during the first six months of next year. Another order of similar size came for delivery during the first quarter. In one instance an inquiry was made for material at present prices for delivery all through the coming year. The market therefore has been ever so much stronger. We continue to quote, f.o.b. cars, Cleveland:

Northern Coke, No. 1 Foundry	$15.00 to $15.50
Northern Coke, No. 2 Foundry	14.50 to 15.00
Northern Coke, No. 3 Foundry	14.00 to 14.50
Southern Coke, No. 1 Foundry	13.75 to 14.25
Southern Coke, No. 2 Foundry	13.25 to 13.75
Southern Coke, No. 1 Soft	13.75 to 14.25
Southern Coke, No. 2 Soft	13.25 to 13.75
Jackson County, 8 per cent. Silicon	.... to 17.95
Hanging Rock Charcoal, No. 1	.... to 23.45
Southern Charcoal, No. 1	20.00 to 20.50
Lake Superior Charcoal	18.50 to 19.00

A decided improvement is generally reported in the labor market, the outlook here for the men to accept lower wages

being very good indeed. The Coke situation is easy, with prices holding barely steady. Good 72-hour Foundry Coke is bringing $2.65 at the oven, with high sulphur Cokes ranging about $2.40 at the oven.

Finished Iron and Steel.—The Bar situation continues to be the center of interest in Steel. It is now evident that the agricultural implement works are experiencing a considerable revival of interest. Most of their factories are being started up again, after some weeks of idleness. This has brought into the market a good supply of new contracts which had been delayed, while others who had previously placed their orders are specifying against contracts already on file. The situation is a decided improvement in most particulars. The tonnage already placed with the mills is enough to keep most of them busy, but without jeopardizing prompt delivery on such orders as shall come in hereafter. Prices have held steady on the Steel product. The buying of Bar Iron has been a little heavier. It is now evident that the mills are meeting competition by charging prices which will get them into the market on even terms with the Valley mills, which are holding for 1.30c., Youngstown. In certain places this means a reduction. Steel prices have held at 1.30c., Pittsburgh, for Bessemer and 1.40c., Pittsburgh, for Open Hearth. The Sheet trade has also revived slightly, the market being in little better shape. It cannot be said, however, that there has been any very marked improvement, the outside work easing up since the weather turned, and the other demands, just before inventory time, not being sufficient to much more than overcome the loss of the outside business. Prices have not changed, holding as follows: No. 27 Black Sheets, in car lots, at mill, 2.35c.; the same gauge, out of stock, 2.50c.; No. 14 Black Sheets, out of stock, 2.15c.; No. 22 and lighter gauges of Galvanized Sheets, out of stock, 75, 10 and 2½ off list, while the other gauges are selling at 70 and 10 off list. It is reported that the labor outlook is very much more favorable in the Structural trade, and some business which has been held back is very likely to come upon the market soon. One big contract which has been pending for several weeks, of 2500 tons, will be closed this week. The buying movement has not started, however, being merely in prospect. That which is in prospect includes a number of good orders for ships, which are being withheld for the time being. The price holds at 1.60c., Pittsburgh. The Plate trade is subject to many such conditions as govern the Structural trade. The additional element is a strong effort to break prices, which has so far been withstood. The price holds at 1.60c., Pittsburgh. The market for Steel Rails is dull, although there is a fair call for Track Supplies other than Rails. The price holds at $28, Pittsburgh. The Billet situation does not improve much, nor has it lost anything. The trade is dull. The price holds steady at $23.50 for Bessemer 4 x 4, Cleveland.

Old Material.—The dealers are still doing a brokerage business in Scrap, trying to force sales on large accumulations which need a market. The constant scaling down of prices, which has been necessary from week to week, seems to have stopped for the time being, but the fact that no cuts in prices were made does not of necessity mean a revival, for the trade has been extremely dull and continues so. We continue to quote, all gross tons: Old Steel Rails, $14 to $15; Old Iron Rails, $16; Old Car Wheels, $13.50 to $14; Railroad Malleable, $13; Cast Borings, $3. All net tons: No. 1 Railroad Wrought, $11 to $12; No. 1 Busheling, $10; Wrought Turnings, $6; Iron Car Axles, $15.50 to $16; No. 1 Cast Scrap, $11.50; Stove Plate, $9.

Birmingham.

BIRMINGHAM, ALA., December 7, 1903.

Considering the season of the year, the demand for Iron keeps up remarkably well. While the orders during the past week may not have been of the magnitude that the preceding week registered, yet they were large enough to class the business as very satisfactory. There was a continuous procession of medium and small orders, and there was with them a right good sprinkling of what could be classed as very respectable orders. Some of the large interests were in the market and took some good size lots, and the character of the buying again showed very plainly a growing interest in the market and a revival of confidence, in marked contrast to what prevailed but a short time ago. In some quarters the price has been advanced to 50c. above what has been accepted as the minimum price, and it is being obtained with less effort than when Iron was quoted at $9, and buyers are holding off for further decline. As late as Saturday Iron could have been bought from some sources on the basis of $9.25 for No. 2 Foundry, but the majority of sellers asked and obtained $9.50. Your correspondent saw the documents accepting more than one purchase on the basis of $9.50 for No. 2 Foundry, the shipments to go to New England points. These same buyers had taken some at $9, and were adding to their stocks under the belief that bottom had been reached and the reaction was at hand. It is impossible to obtain the particulars of sales, both as to magnitude and prices, in the majority of cases. You can get just about enough to keep posted as to the trend of the market. There was one sale of 1000 tons on the basis of $9.50 for No. 2 Foundry, delivery in December, January and February, and there were sales by others running from 100 tons up to 5000 tons on about the same basis. The majority of the sellers are firm at this price, but, as stated above, some can yet be had at a basis of $9.25 for No. 2 Foundry. There is a strong feeling among the Iron people as to the market during 1904, and none of them are anticipating prices below those now prevailing. The most of them are confident of a material advance, and because of this belief they are discouraging all business for long delivery. So far as can be ascertained, but very little business has been accepted that involved delivery beyond the first quarter of 1904. In spite of the caution exercised in keeping sales quiet, they will leak out. For November, the shipments of the Sloss Company aggregated 42,000 tons. For the current month they will be fully that amount, and probably more. The sales of another large interest for the current month, it is learned from good authority, will amount to 60,000 tons, which amount, it is calculated, will be at least 50 per cent. more than their current output. So that shipments from these two interests alone will aggregate over 100,000 tons. It is safe to say that the total shipments due the current month on account of sales made will foot up to the neighborhood of 150,000 tons. And we won't ship that amount. A part of it, and a good part of it at that, will be lapped over into January. These shipments will make a big hole in the stocks in furnace yards. The energy of both furnace and railroad interests is now exerted to obtain cars and to load them. The more important interests are getting all they can comfortably handle. Some of the smaller interests complain of neglect. When bad weather comes, all will join the chorus for more cars.

There has been more doing in the export trade than operators have been willing to make public. Some small business has been registered, but nothing of moment was worked, until Friday of the past week, when negotiations terminated in one sale of 6000 tons. The seller refuses all information concerning the sale and won't admit it was made. But the information is from such sources as to leave no doubt in the mind of your correspondent as to its correctness. It is stated in the daily press that some export Iron was sent last week to Pensacola, to meet ship. These sales, as a rule, ars so jealously guarded that it is often very difficult to obtain any information concerning them.

The Pipe plants still report some new business coming in and now quote important orders at $23.50 for 4-inch, $23 for 6-inch, $22 for 8 to 16 inch, and $21 for the heavy sizes. For the latter they report for the time being an almost nominal demand, but for the smaller sizes there is a very fair demand. It is understood here that one of the important interests at Bessemer is bidding on part of the work on the Pennsylvania tunnel at New York.

It is publicly announced that efforts to establish a Steel mill at Anniston have been successful, and that Steel will be made there under the Hawkins' process, in which it is claimed that the output is double that of the old process in the same time. It is claimed that $500,000 is ready for financing the enterprise.

The report upon the Steel casting plant, mentioned some time ago, was made at a meeting of the Commercial Club on Saturday, and established the fact of its certainty. There are other enterprises being considered, to mention which is, as yet, out of order.

It is announced as a certainty in the near future that a Spike mill, a rolling mill and a Steel plant will be established here. Chicago parties get the credit of fathering these enterprises. There is not much chance of any of them maturing before the holidays.

There is a continuation of interest being manifested in Coal properties. Development of the Coal property owned by Pennsylvania parties is being pushed. The Coal is being mined and piled, awaiting the completion of the tracks thereto from the Louisville & Nashville Railroad. The investment so far represents $90,000, and they expect to become large and steady shippers of Coal commencing in January.

An important event of the week was the transfer of 29,000 acres of land in Walker County, which consists principally of mineral and Coal lands. It is an investment deal, and the property will not be developed as yet. There is nothing of consequence to add concerning Coal and Coke. Prices are as last quoted and demand continues good. Shippers are not getting all the cars they need, but are loading all that are furnished by the various roads.

A conference was held at Youngstown, Ohio, last week between James H. Nutt, Labor Commissioner of the Republic Iron & Steel Company, and officials of the Amalgamated Association over the differences in the finishers' scale in the Valley works of the Republic Iron & Steel Company. Nothing was done at the conference, and it adjourned without date.

Cincinnati.

FIFTH AND MAIN STS., December 9, 1903.—(*By Telegraph.*)

The past week has been a period of considerable activity in the market for Southern Pig Iron. The Northern product, by the way, is still out of the market on account of the great difference existing in the price-list from the two sections of the country. Sales have been made extending through the first six months of the coming year, though the majority of business has been for first quarter or even shorter periods of delivery, while a few furnaces have accepted occasional orders for extended delivery; yet it is a fact that all of them are indifferent, to say the least, to propositions which carry the period of delivery more than three or four months in advance, and it would be much more to the general liking, with deliveries limited 60 days from date of sale. There has been quite a good aggregate of Southern Iron disposed of, and as this activity has continued for some weeks now, most of the furnaces are feeling much more independent than they were, and the market is to a degree stiffer on that account. A number of furnaces whose order books are now pretty well filled are out of the market, except on a basis of $10, Birmingham, for No. 2 Foundry. The largest producers in the South have openly announced their minimum price to be $9.50, same basis, while a few furnaces are still willing to accept orders for delivery within the next quarter on the basis of $9.25. When it was announced in *The Iron Age* of last week's issue that the $9 Iron had all been withdrawn from the market, the announcement was perhaps a little premature, for the reason that the largest Southern interest appear to have had a number of options out on which there was no expiration mentioned; hence when the market had the appearance of stiffening up, and the announcement made by this furnace company and others that $9 Iron had been withdrawn, a number of parties holding these $9 options ran in and forced the furnace into the sale of quite a large aggregate of Iron. This episode, as a matter of fact, upset the tenor of the situation considerably, and quite a pressure was brought to bear on other furnace interests to have them meet these figures. So far as known, however, the price was not met, and the outstanding options having been withdrawn, the market may be considered pretty firm at this date on the basis of $9.25 to $9.50, Birmingham, for No. 2 Foundry. There are still quite a number of buyers in the market, and the general appearance is that there will be quite a large amount of Iron sold before the present buying movement ceases. It is announced here that a large block, amounting to 80,000 tons of Iron, which is lying in the furnace yard of one of the largest Alabama interests has been bought in by a syndicate of interested parties on the basis of $9.10 for No. 2 Foundry, Birmingham, and that the syndicate have paid for the Iron in cash and withdrawn the entire amount from the market. This sale, it may be well to add, is understood to be the cause of the stiffening up by that furnace to the basis of $9.50, Birmingham, for No. 2. The buyers of the Iron have announced their intention of holding the Iron indefinitely, believing it to be a good purchase at the figure. Freight rates from Hanging Rock district to Cincinnati, $1.15, and from Birmingham, $2.75. We quote, f.o.b. Cincinnati, as follows:

Southern Coke, No. 1	$12.50 to $13.00
Southern Coke, No. 2	12.00 to 12.50
Southern Coke, No. 3	11.50 to 12.00
Southern Coke, No. 4	11.00 to 11.50
Southern Coke, No. 1 Soft	12.50 to 13.00
Southern Coke, No. 2 Soft	12.00 to 12.50
Southern Coke, Gray Forge	10.75 to 11.00
Southern Coke, Mottled	10.75 to 11.00
Ohio Silvery, No. 1	17.65 to 18.15
Lake Superior Coke, No. 1	15.65 to 16.15
Lake Superior Coke, No. 2	15.15 to 15.65
Lake Superior Coke, No. 3	14.65 to 15.15

Car Wheel and Malleable Irons.

Standard Southern Car Wheel	$20.00 to $21.00
Lake Superior Car Wheel and Malleable	19.00 to 20.00

Old Material.—Dealers in Old Material are at a loss to know what has struck the market. It is asserted that within the last 60 days business has dropped off to the extent of more than 75 per cent., and values at this date are uncertain, and would probably be lower than the figures given herewith, were some genuine buyers to appear in the market ready for business. The offerings of almost all kinds of Scrap and Old Material are unusually large, No. 1 Railroad Wrought being offered heavily by the railroads, and buyers exceedingly few and hard to land. We quote dealers' buying prices, f.o.b. Cincinnati, as follows: No. 1 Wrought Railroad Scrap, $9 to $10 per net ton; Cast Scrap, $9 per gross ton; Iron Rails, $13 per gross ton; Iron Axles, $15 per gross ton; Car Wheels, $12.50 to $13 per gross ton; Steel Rails, $9 per gross ton; Steel Axles, $13 per gross ton; Heavy Melting Steel, $8 to $8.50 per gross ton; Borings, $2.50 per net ton; Turnings, $6 per net ton.

Finished Material.—The market is regarded as very inactive and not exceedingly strong upon the quotations furnished herewith, though, by the way, no complaints are had of any serious cutting of these prices. We quote, f.o.b. Cincinnati: Iron Bars, in carload lots, 1.35c., with half extras; the same in smaller lots, $1.90c., with full extras; Steel Bars, carload lots, 1.43c., with half extras; the same in small lots, 1.80c., with full extras; Base Angles, 1.73c. in carload lots; Beams and Channels, in carload lots, 1.73c.; Plates, ¼-inch and heavier, 1.70c., in carload lots; in smaller lots, 2c.; Sheets, 16 gauge, in carload lots, 2.05c.; in smaller lots, 2.60c.; 14 gauge, in carload lots, 1.95c.; in smaller lots, 2.50c.; Steel Tire, ¾ x 3-16 and heavier, 1.63c., in carload lots.

Pittsburgh.

PARK BUILDING, December 9, 1903.—(*By Telegraph.*)

Pig Iron.—We can report a distinctly better feeling in the Pig Iron trade, inquiry being very much better, and actual sales are larger than for some time. Prices seem to be hardening, and the Southern furnaces have advanced prices on No. 2 Foundry to the basis of $9.50, Birmingham, equal to $13.85, Pittsburgh. The Northern furnaces have also advanced their prices on Foundry Iron, and now quote on the basis of $13.50, Valley, or $14.35, Pittsburgh. This price is generally being obtained, and we can report actual sales of 4000 to 5000 tons, mostly for delivery in first quarter at this price. While the demand for Bessemer Iron is somewhat quiet the market is firmer, and prices are from $13.75 up to $14, Valley furnace. A general reduction in blast furnace labor in the Mahoning and Shenango valleys and in the Pittsburgh district will go into effect on January 1. Common labor is now paid $1.65 a day, and it will be reduced about 10 per cent. A good deal of buying of Pig Iron for the first quarter delivery is expected this month. Prices are very close to actual cost of production, and the shut down movement started in October has materially benefited the market. J. G. Butler of the Bessemer Furnace Association states that blast furnaces in the Central West, with a total daily capacity of 37,000 tons, or a yearly capacity of about 14,000,000 tons, showed up to December 1 65 furnaces in blast and 91 stacks idle, or an idle capacity of 57 per cent. of the whole district.

Steel.—The market continues very quiet, and very little Steel is being sold under the Billet arrangement. The Billet mills are to meet on December 15, and it is believed that the present price of $23, Pittsburgh, for Bessemer and Open Hearth Billets will be reaffirmed. While very little Steel is sold by the pool, most consumers being covered by special contracts, which gives these consumers their Billets and Sheet Bars at somewhat lower prices than prevail in the open market, yet the regulation of the price has a good effect on the market for Finished Iron and Steel.

Iron and Steel Scrap.—The Scrap market is practically lifeless and very little material is changing hands. Consumers of Heavy Melting Stock are offering $11 to $11.50 for it in gross tons, and have been able to pick up small lots at these prices. No. 1 Wrought Scrap is held at $10 to $10.50, net tons. Cast Iron Borings have sold at $5 or lower.

(*By Mail.*)

The Coke interests are still at work on their plan for putting the Coke business in the hands of a central selling agency, and we can report that progress is being made in this matter. It is understood that all the leading Coke interests, with the exception of one or two, are favorable to the scheme and have consented to go into it. A meeting of the Coke Committee, appointed at the first conference, was to have been held to-day, but has been postponed until later in the week. The plan embraces the placing of the entire product of the Coke interests in the hands of a central selling agency. The Coke has been put into four classes, and prices have been suggested for each class, according to quality. The fact that there is some probability of this project going through has induced some of the blast furnace interests to cover on their requirements of Coke for next year, and several such contracts have been placed and others are pending. While the open price of strictly Connellsville Furnace Coke has been $1.65 to $1.75, it is understood that several contracts for next year have been closed on a slightly lower basis. This morning a meeting of the independent Sheet mills was held in the Hotel Lincoln, in this city, which was largely attended. At the same time a conference of the Sheet Committee of the Amalgamated Association was in session in this city for the purpose of considering the demand made by the independent Sheet mills that they be granted the same reduction in wages made in nonunion sheet mills of the American Sheet Steel Company. This afternoon a joint meeting of the outside Sheet mills and the Sheet Commitee of the Amalgamated Association is being held and is still in session. A few of the Sheet mills of the American Sheet Steel Company are operated on a union basis and sign the Amalgamated scale. At these mills the present Amalgamated wages are in force, but it is understood that next week a conference is to be held between officials of the Amalgamated Association and the United States Steel Corporation for the purpose of arranging wages in the union mills. It is hardly probable the American Sheet Steel Company will

continue to pay Amalgamated wages in their union Sheet mills, when they are operating most of their plants at wages 20 per cent. or more below those called for in the Amalgamated scale. It is almost certain that the limit of output in independent Sheet mills will be removed. We can note a considerably better feeling in Iron trade circles, and inquiries in the past week have been better than for some time. While actual tonnage being placed is not very much heavier, yet there is a good, healthy inquiry, and the opinion very generally prevails that we may confidently expect a material increase in business after the first of the year. The heavy reduction in prices made on nearly all kinds of Iron and Steel have put them very close to cost of production, and there is not much room for further lowering of prices. For this reason confidence seems to be slowly returning, and the trade is more inclined to place orders. Tonnage moving in Bessemer Pig Iron is slightly larger, and prices ranging from $13.50, minimum, up to $13.75 at Valley furnace. It is the impression that at the meeting of the Steel Billet mills, to be held on Tuesday, December 15, prices will be reaffirmed on the present basis of $23, Pittsburgh, for Bessemer and Open Hearth Billets. While it is true that the amount of Steel sold by the Billet pool is relatively small, yet at the same time the regulating of the price has the effect of steadying the whole market. Should the Steel business not be controlled by agreement, but prices be wide open, it would necessitate a readjustment of prices on all kinds of Finished Iron and Steel to a lower basis. Structural shops report inquiries better than for some time, and the outlook for the building trade next year is very satisfactory. The demand for all kinds of Finished Iron and Steel, while quiet, is showing some betterment, and it is believed that the worst of the dull market is over. Better things in the Iron trade are confidently expected after the turn of the year.

Steel Rails.—There is very little doing in Steel Rails, and we understand that owing to active competition some low prices are being made in the business coming up in Light Rails. In some cases these have sold at very close to the price of Standard Sections, which we quote at $28, at mill.

Ferromanganese.—The report that the leading domestic producer of Ferromanganese has withdrawn from the association is not confirmed. However, prices of Ferromanganese are lower than for some time. We quote at $47, delivered, in 50-ton lots and over, and $48 to $49, delivered, for carloads. The leading consumers of Ferro are covered for some time ahead, and, in fact, a great deal of Ferro has been offered for resale at exceptionally low prices.

Plates.—The outcome of the meeting of the Plate Association, to be held in New York next week, is awaited with a good deal of interest. Opinion is divided as to whether there will be a reduction made in prices. Tonnage in Plates, while not satisfactory by any means, is fairly large, and more orders are being placed than for some time. These orders, however, are mostly for small lots, consumers still refusing to contract on account of the uncertainty as to whether present prices will be maintained. We quote: Tank Plate, ¼-inch thick and up to 100 inches in width, 1.60c., at mill, Pittsburgh; Flange and Boiler Steel, 1.70c.; Marine, Ordinary Fire Box, American Boiler Manufacturers' Association specifications, 1.80c.; Still Bottom Steel, 1.90c.; Locomotive Fire Box, not less than 2.10c., and it ranges in price up to 3c. Plates more than 100 inches in width, 5c. extra per 100 lbs. Plate 3-16 inch in thickness, $2 extra; gauge Nos. 7 and 8, $3 extra; No. 9, $5 extra. These quotations are based on carload lots, with 5c. extra for less than carload lots; terms net cash in 30 days.

Sheets.—There is a fair demand for Sheets, and prices are now so low, based on the price of Sheet Bars, that there is really very little room for any cutting. Orders are mostly of a hand to mouth character, buyers declining to contract. We quote No. 27 Black Sheets, box annealed, one pass through cold rolls, at 2.30c., and No. 28 at 2.35c. Galvanized Sheets are quoted at 80 per cent. off in carloads at mill. In net prices this is 2.80c. for No. 24, 3c. for Nos. 25 and 26, 3.20c for No. 27, 3.40c. for No. 28, and 3.80c. for No. 29. For desirable specifications and on attractive orders it is possible a few mills might slightly shade these prices. Jobbers charge the usual advance over these prices for smaller lots from store.

Iron and Steel Bars.—The trade are anticipating with a good deal of interest the action to be taken at the meeting of the Steel Bar mills, to be held on Tuesday, December 15. Some in the trade anticipate a further reduction in prices, but if the present price of Billets, which is $23, is reaffirmed, it is not likely there will be any change in price of Steel Bars. Demand is fairly large, probably a little heavier than some time ago, and specifications on contracts are coming in a little more freely. However, the demand for both Iron and Steel Bars, in view of the present low prices, is not up to expectations by any means. We quote Iron Bars in carloads and for desirable specifications at 1.30c. to 1.35c., Youngstown, or 1.34¾c. to 1.39¾c., Pittsburgh. We quote Steel Bars at 1.30c., Pittsburgh, in carloads and larger lots. For quantities less than 2000 lbs. and not less than 1000 lbs., the price is 1.40c., and for less than 1000 lbs. the price is 1.50c.

Structural Material.—Among contracts recently placed was a large Steel building for the Lackawanna Steel Company, at Buffalo, about 600 tons; a large building for the Ward-Dickey Steel Company, at Indiana Harbor; a railroad bridge, at Lowellville, Ohio, and numerous other small contracts. Structural concerns and foundries all over the country are busy figuring on the work for the tunnel in New York City. The general outlook for the Structural trade is regarded as very bright, and, barring labor and financial troubles, it is believed 1904 will be a banner year in the building trade. The Beam Association is to hold a meeting in New York next week, and it is said some of the larger interests are favorable to a reduction in prices. We quote: Beams and Channels, up to 15-inch, 1.60c.; over 15-inch, 1.70c.; Angles, 3 x 2 up to 6 x 6, 1.60c.; Zees, 1.60c.; Tees, 1.60c.; Steel Bars, 1.60c., half extras, at mill; Universal and Sheared Plates, 1.60c.

Tin Plate.—A fair amount of tonnage is being placed, but at the same time it is estimated that 50 per cent. or more of the Tin Plate capacity is idle. Some of the principal plants of the American Tin Plate Company are closed in all departments. We quote 100-lb. Cokes at $3.60, Pittsburgh.

Merchant Steel.—A few small sized contracts have been placed, but general buying is of a hand to mouth character. We quote: Tire Steel, 1.50c.; Open Hearth Spring, 1.90c. to 2c.; Toe Calk, 1.70c. to 1.80c.; Sleigh Shoe Steel from 1.90c. to 1.95c. The above prices are for carloads at mill, the usual differentials being charged for small lots. Tool Steel is 6c. to 8c. for ordinary grades, and Cold Rolled Shafting is 52 per cent. off in carloads, and 47 per cent. in less than carloads, delivered in base territory.

Railroad Spikes.—We note quite a heavy demand for Railroad Spike and local mills are running quite full. We quote at $1.85 per 100 lbs.

Spelter.—The market is still declining, and we quote prime Western Spelter at 4.65c. to 4.70c. for January delivery. For spot shipment about 4.75c., Pittsburgh, is quoted.

Skelp.—The market is extremely quiet, and we quote Grooved Iron Skelp at 1.45c. to 1.50c. and Sheared at 1.55c. to 1.60c., Pittsburgh.

Merchant Pipe.—The market is quiet, the trade generally anticipating a lower range of prices, and are placing orders only for actual needs. Concessions in prices are easily obtainable and range from 5 and 2½ per cent. for Steel to 5 per cent. for Iron. Discounts to consumers, which are shaded, as noted above, are as follows:

	Steel.		Wrought Iron.	
	Black.	Galv.	Black.	Galv.
	Per cent.	Per cent.	Per cent.	Per cent.
⅛, ¼ and ⅜ inch	68	58	65	55
½ inch	70	60	67	57
¾ to 6 inches	75	65	72	62
7 to 12 inches	69	59	66	56

Merchant Boiler Tubes.

	Steel.	Iron.
1 to 1¼ inches	42½	39
1¾ to 2½ inches	55½	38
2¾ to 5 inches	61	48
6 to 13 inches	55½	38

Coke.—The movement under way to put the Coke business in the hands of a central selling agency is referred to at length in the opening paragraph of the report. Some in the Coke trade believe the plan is feasible, while others are sanguine that it will go through. In the mean time some contracts for Furnace Coke for all of next year have been placed. There is a wide range in prices of Furnace and Foundry Coke, and sales of both have been made at extremely low figures in cases where the Coke was loaded in cars and had to be removed. The general market on strictly Connellsville Furnace Coke is $1.65 to $1.75, and on strictly 72-hour Foundry, $2.15 to $2.40, at oven. Main Line Coke, which is not as high in quality as genuine Connellsville, is selling as low as $1.40 for Furnace and $1.75 to $2 for Foundry.

The La Belle Iron Works, Steubenville, Ohio, have opened a brance office in Room 2007 Farmers' Bank Building, Pittsburgh, with R. G. Campbell in charge. Mr. Campbell will have charge of the sales in the Pittsburgh district of the products of the La Belle Iron Works, consisting of Basic Pig Iron, Basic Open Hearth Steel Billets, Blooms and Slabs and Sheet Bars; also Plates from 6½ to 26 inches wide, Steel Skelp, Steel Pipe up to 12 inches in diameter, Steel Cut Nails, Shovel and Tack Plate and special Steel for stamping purposes.

F. R. Phillips & Sons Company, Rolling Mill Machinery, Iron, Steel and Coal, have removed from 721 to 325 Park Building, Pittsburgh.

New York.

NEW YORK, December 9, 1903.

Pig Iron.—While the local market is quiet, the general inquiries coming to sales agents in the city are quite abundant, notably so far as Basic Pig is concerned. Northern makers adhere to their former figures and are taking a fair aggregate tonnage for prompt delivery and to piece out. The leading Southern interest have made two advances of 25c. each during the past week, the last yesterday, and some business has been done at the higher figures, in spite of the short time which has elapsed. Basic Pig is selling at $13.75 to $14, delivered, with $13.50 as the figure for Virginia Irons, which can reach certain interior points to best advantage. We continue to quote: Northern No. 1 X Foundry, $15 to $16; No. 2 X Foundry, $14.50 to $15, and Gray Forge, $13.75 to $14.50, tidewater. Tennessee and Alabama brands are quoted $13.50 to $14 for No. 1, $13 to $13.50 for No. 2, and $12.50 to $13 for No. 3.

Steel Rails.—There has been more activity and some round sales have been made. We continue to quote $28 at mill for Standard Sections.

Cast Iron Pipe.—The requirements of this city are running larger than had been anticipated. Our reports have frequently made reference to orders placed by the municipality. Further good tonnages are now coming out. About 8000 tons for Brooklyn requirements, consisting of various sizes, running from 6 to 20 inches, will be placed to-day. This pipe will be delivered throughout the winter and spring. Next week from 6000 to 8000 tons more will be let by the city. Specifications for other work are coming out unusually early, and Pipe manufacturers are feeling greatly encouraged over the prospects. They are quite confident that prices will be somewhat better after the turn of the year, and some are refraining from competing on the business now being placed, as they do not desire to make the prices necessary to secure the work. Carload lots are quoted at $28 per gross ton for 6 to 10 inch, and $27 for 12-inch upward at tidewater, these prices being shaded on large quantities.

Finished Iron and Steel.—The American Bridge Company note an improvement in the demand for Structural work. Their orders for the past month have not been large, running from 20 to 2000 tons, yet they were able to secure a total for the month of about 40,000 tons, which is regarded as very satisfactory. The prospects are excellent for even more tonnage this month, and they expect to close the year showing a greater volume of business for 1903 than 1902. It will be under 1901, which was the banner year. The outlook for business from the building trades has improved, and while few office buildings are now in sight, a great deal of work is scheduled in the line of other buildings which will take good quantities of shapes. A decided tendency is observed toward the erection of Steel frame work buildings of moderate size. The Plate trade is quiet, buyers being disposed to wait for the meeting of the manufacturers in this city on December 17 to see whether prices may then be reduced. The approaching inventory period also has its effect in restricting purchases. Prices are firmly held in the meantime. The Bar trade is also quiescent, as usual at this time. The tendency to lower prices on Bar Iron appears to have been checked, buyers no longer being able to secure further concessions. A meeting of the Eastern manufacturers will be held in this city on December 17 and important action is expected. It is quite likely that the old Bar Iron Association may be revived. We quote, at tidewater, as follows: Beams, Channels and Zees, 1.75c. to 2c.; Angles, 1.75c. to 2c.; Tees, 1.80c. to 2c.; Bulb Angles and Deck Beams, 1.90c. to 2.85c. Sheared Plates, in carload lots, are 1.78c. to 1.85c for Tank, 2c. to 2.10c. for Flange, 2.10c. to 2.20c. for Marine and 2.25c. upward for Fire Box. Refined Bars are 1.40c. to 1.60c., according to quality; Soft Steel Bars, 1.44½c. to 1.50c.

Old Material.—Offerings of all kinds of Old Material are heavy, but the buying movement is light. Consumers are confining their purchases to pronounced bargains, but it must be noted that bargains are not plentiful, as holders are not so anxious to realize as they were. The export trade in Old Steel Rails to the Mediterranean has been checked by the sharp advance in freight rates. The steamship companies appear to have combined on a rate of 12 shillings 6 pence to Italian ports, which is an advance of about 4 shillings on old rates. Approximate figures are as follows, per gross ton, New York and vicinity:

Old Iron Rails	$15.00 to $15.50
Old Steel Rails, long lengths	11.50 to 12.50
Old Steel Rails, short pieces	10.50 to 11.00
Relaying Rails, heavy sections	18.00 to 19.00
Old Car Wheels	12.00 to 13.00
Old Iron Car Axles	15.50 to 16.50
Old Steel Car Axles	14.00 to 15.00
Heavy Melting Steel Scrap	10.50 to 11.00
No. 1 Railroad Wrought Iron	12.50 to 13.50
Iron Track Scrap	11.50 to 12.50
Wrought Pipe	8.50 to 9.50
Ordinary Light Iron	7.00 to 7.50
Cast Borings	5.00 to 5.50
Wrought Turnings	7.50 to 8.00
No. 1 Machinery Cast	12.00 to 12.50
Stove Plate	9.50 to 10.50

Metal Market.

NEW YORK, December 9, 1903.

Pig Tin.—Existing conditions have been fully taken advantage of by the speculative element, who through their operations, both here and abroad, have brought about what virtually amounts to a corner in spot Tin. On the strength of their success in this direction they have advanced prices very materially. Their manipulations have resulted in the fact that only 315 tons arrived so far this month, and unless something extraordinary happens, but 25 tons can arrive for December delivery. The manipulation, it is said, is being carried on by a large American house, who are working in conjunction with London interests who are holding the stocks at present. Business between importers and dealers here has been more active during the last two days than at any time for weeks past. Consuming demand was also a little better in a small way, but large transactions continued as quiet as ever. No improvement to speak of is expected in the consumptive demand for several weeks. Spot and December delivery were quoted at the close to-day at 27c. to 27¼c. The London cables announced £123 7s. 6d. for spot and £124 12s. 6d. for futures.

Copper.—A reaction was brought about yesterday which sent prices upward several points both here and in London. The movement began, in fact, on the other side, where a good deal of booming is going on both as to the price of the metal and Amalgamated shares. Business in this market has shown improvement in a small way, and there is talk of something shaping up in the way of a selling pool here. Export business is also said to have improved slightly. At this writing "official" quotations are as follows: Lake, 12.25c. to 12.37½c.; Electrolytic, 12.12½c. to 12.25c.; Casting, 12c. to 12.12½c. The London market advanced to £56 10s. for spot and £56 for futures. Best Selected has advanced 5 shillings in the week to £59 15s.

Pig Lead.—The spot situation seems to be easing up somewhat, although the price for spot in store is still nominally 4.25c. Quotations of 4.15c. are being made "lighterage free." Fifty-ton lots at 30 days' delivery are still quoted 4.10c., which is the American Smelting & Refining Company's price for Desilverized under these conditions. St. Louis wires 4.02½c. to 4.05c., and the London cable shows a slight decline to £11 1s. 3d.

Spelter—Is quiet and unchanged. While figures are nominally the same as they were last week, there are indications of less firmness than existed a week ago. Spot is still held at 5.25c., but December delivery is freely quoted 4.75c. St. Louis has declined, while London has stiffened a shade to £21.

Antimony.—The market is quiet and unchanged. Cookson's is quoted at 7c., Hallett's at 6¼c. and other brands at 5¾c.

Nickel.—No change is noted in this market, 40c. to 45c. being quoted for large lots, and 50c. to 60c. for smaller quantities.

Quicksilver.—The market is quiet, but steady. Flasks of 76½ lbs. are quoted at $47.50. London is quoted at £8 5s.

Tin Plates.—There is no change in the situation here. Quotations are made on the basis of $3.60 per box of 14 x 20 100-lb. Cokes, f.o.b. mill, equivalent to $3.79, New York. Welsh Plates have declined 1½ pence to 10 shillings 10½ pence, f.o.b. Swansea.

N. & G. Taylor Company, manufacturers of Tin Plate, Philadelphia, have opened a London office at 18 Fenchurch Building, Fenchurch street, London. They still retain their old Liverpool branch at 12 Masons Building, Exchange street, East, Liverpool.

Department of Commerce and Labor.

Secretary Cortelyou Submits His First Annual Report.

WASHINGTON, D. C., December 8, 1903.—The first annual report of Secretary George B. Cortelyou of the Department of Commerce and Labor has been submitted to the President. It will be found to be of great interest and importance, not only as the initial report of a new executive department, but as outlining the Administration's policy concerning many questions intimately connected with the industrial and commercial welfare of the country. Secretary Cortelyou's remarks with regard to the work done, and to be done, by the Bureau of Corporations and the Bureau of Labor, and his suggestions with reference to the appointment of a special commission to recommend legislation for the development of the American merchant marine, will no doubt attract much attention. Following is an advance abstract of the report:

Bureau of Manufactures.

The organization of the Bureau of Manufactures has been necessarily postponed in the absence of adequate appropriations. No time has been lost, however, as the work of this bureau, in some respects, will resemble certain phases of the present duties of the Census Bureau and the Bureau of Statistics. Some readjustment of the work will be required to secure the best results from these branches of the service, and the plans for redistribution of duties have not yet been fully formulated. These plans, however, will be ready as soon as Congress shall have provided the funds with which to organize a new bureau. Under present conditions any work assigned to it could be carried on only by the detail of clerks from other branches of the Department, and no clerks are available for that purpose.

Bureau of Corporations.

It is the duty of the Bureau of Corporations to gather information on the subject of interstate and foreign commerce, to investigate the organization, conduct and management of corporations and joint stock companies engaged in such commerce (other than common carriers subject to the jurisdiction of the Interstate Commerce Commission), to report the results of such investigations to the President through the Secretary of Commerce and Labor, and to compile and publish useful information concerning corporations engaged in interstate and foreign commerce, including insurance companies. As an aid to investigation, the Commissioner of Corporations is given like powers to those granted the Interstate Commerce Commission. Since the organization of the Bureau on February 26, 1903, exhaustive studies have been undertaken in the following fields:

1. A systematic study of the law creating the bureau.
2. The general subject of interstate commerce and the powers of the Federal Government in relation thereto.
3. The decisions of the Federal courts relating to corporations engaged in interstate commerce which are subject to the jurisdiction of the bureau.
4. The jurisdiction and powers of the Interstate Commerce Commission.
5. The decisions of the Federal courts in relation to trade conspiracies, monopolies and combinations in restraint of trade.
6. The corporation laws of the various States and Territories, particularly those relating to the annual reports and the returns for taxation purposes required from such corporations.
7. The methods of taxing corporations in each State and the decisions relating to the taxation of interstate commerce.
8. The effect of industrial combinations upon the prices of the commodities sold by such combinations, the effect of tariff duties upon the prices of commodities subject to such duties, and the reasons for the differences, if any exist, between the domestic and foreign prices of commodities manufactured by the protected industrial combinations of this country.
9. The powers of the Federal Government in relation to insurance companies.

From a preliminary study, it became apparent that the public records of States and Territories, the reports of special committees appointed under State or Federal authority, the files of certain Government officials, and various commercial and industrial publications contained a fund of valuable information on the subjects to be investigated. This information is being brought together, analyzed and properly indexed, in order that the facts already known may be utilized in planning more specific inquiries.

The field of work that lies open to the bureau is almost unlimited in extent, and it is believed that if proper means are made available results of far reaching consequence can be accomplished. Since July 1 the bureau's operations have been extended so rapidly that the special appropriation provided is now practically exhausted. In order that the investigations already begun may be effectively completed and the information gained be utilized to the best possible advantage, a liberal addition to the present appropriation should be granted.

The creation of the bureau was viewed by some with alarm, or at least with suspicion. It was feared that the powers granted might be hastily or inadvisedly used to the injury of ligitimate enterprise. No such purpose actuated the framers of the law; no such purpose will control its administration. Many corporations have been granted important privileges by the public, and some of these corporations, through consolidation of capital, have acquired extensive influence in the industrial affairs of the country. Such privileges, if used improperly, not only retard the progress of industry, but frequently breed corruption in politics. The legislation creating the Bureau of Corporations was the expression of a popular belief that further safeguards should be provided for the regulation of business enterprises to which special privileges have been granted by the people. Publicity will disclose unfair dealing, dishonesty and corruption, but if properly enforced it will not disclose to trade competitors the fruits of individual thrift and initiative, nor permit in any other manner the invasion of private rights.

Bureau of Labor.

The Department is empowered to acquire and diffuse among the people of the United States useful information on subjects connected with labor, in the most general and comprehensive sense of the word, especially regarding its relation to capital, such as the hours of labor and the earnings of laboring men and women; the means in general of promoting their material, social, intellectual and moral condition; the elements of cost, or approximate cost of products; the comparative cost of living and the kind of living; the articles controlled by trusts or other combinations of capital, business operations, or labor, and the effect such trusts or other combinations have on production and prices; the causes of and facts relating to all controversies and disputes between employers and employees.

Capitalists and wage receivers are to be treated on an equality, for in these matters relating to labor and capital and to their respective representatives the Department must stand in the position of an educational office, collecting and publishing such information as will enable each party to understand more fully the prevailing conditions.

The Department has no executive functions relative to the settlement of labor disputes. It cannot interfere on behalf of either employer or employee in controversies arising between them.

Whatever enables either party to secure necessary information falls within the authority of law. That authority does warrant the Department in publishing any information drawn from conditions in this or in other countries which will be helpful in bringing about fuller knowledge and better understanding. Employer and employee are dependent upon each other, and the recognition of the welfare of both, and of the means of assisting in securing that welfare, will be assiduously cultivated. All possible measures of an educational nature will be employed to induce the representatives of labor and capital to conduct their affairs on a basis which shall not interfere with the general welfare of those not engaged in the disputes. This general policy must commend itself to the wisdom of employer and employee alike, as it is in the interests of both. As the result of investigations in progress or completed forthcoming bulletins will contain the following special articles:

Labor Unions and British Industry.
Labor Conditions in Australia.
Labor Conditions in the Philippine Islands.
The Revival of Handicrafts in the United States.

Trade Union Movement Among the Coal Mine Workers of the United States.

The Bureau of Labor has rendered effective service in its special field. The Department will utilize to the fullest extent the experience that has been gained in this important bureau, and will seek to make more and more available the information it can obtain and to secure larger results from its work. The Department's statistics on labor, as well as its statistics on other subjects, will be gathered fairly, given out fairly, and as far as possible will be made to represent accurately conditions found to exist.

Steamboat and Boiler Inspection.

The report states that the Board of Supervising Inspectors held a special session during the summer, at which some changes in these general acts and regulations were considered. The proposed changes are now under examination by the Department. With other recommendations prompted by the defects of the present inspection system, the Department will incorporate such of these proposed changes as seem desirable in a bill to amend the laws now in force. This bill will be submitted to Congress for its consideration during the present regular session.

American Merchant Marine.

Congress has made it the duty of the Department of Commerce and Labor to foster, promote and develop our shipping interests. Commerce and labor, however, are not the only interests concerned in the improvement of our merchant shipping. Recent legislation and administration have aimed to render more effective the militia of the States as an important factor in the national defense. In our past wars the men and ships of the merchant marine were the reserves that put our navy on a war footing, and under like circumstances they must perform the same service. Government aid to the merchant marine in its naval features should conform closely to our general naval policy. The position amnog nations now occupied by the United States warrants the maintenance of an ocean mail service equal to that of the United Kingdom or of Germany, in order that, like those countries, we may possess the best possible facilities of communication in our dealings with distant quarters of the world. By the establishment of such service other nations have helped to build up their shipbuilding industries and to strengthen their position on the sea. Expenditures for ocean mails, however, concern most directly the Post Office Department, and must be adjusted according to the means Congress has placed at its disposal.

Should Congress provide for a commission, to be composed of the heads of the departments most nearly concerned, who could report jointly upon the relations of the merchant marine to each of these branches of government, and recommend legislation for the development of our commercial shipping in a manner best calculated to serve all the public interests concerned, some of the grounds of the present difference and disputes would be removed. If the proposed commission should include also a proper representation from the two branches of Congress, so that the investigation could readily cover matters that are pertinent from the legislative point of view, the chances for the adoption of a definite and enduring policy, to replace the uncertainty now existing would be largely increased. Secretary Cortelyou earnestly recommends that such action be taken.

Future of the Department.

In concluding his report, the Secretary says: "The Department deals with the great concerns of commercial and industrial life. To be of service to these interests it must have their hearty co-operation and support. It must be a department of business. It must be progressive, but at the same time conservative. It must not deviate in its course from the pathway of justice, strict and impartial. It must be nonpartisan in the highest and broadest sense. It must recognize to distinction, as between large and small interests, as between the affluent or powerful and the humblest citizen. If it attempts to occupy a field that properly belongs to private endeavor it will inevitably fail to realize the high hopes of its present well wishers. It must adhere rigidly to the lines marked out since the foundation of the Government for Federal agencies in executing the will of the people. If these general principles are made effective, if conservatism and impartiality, coupled with ever increasing efficiency, mark its administration, I cannot but believe that this new Department will become a mighty influence for good in our commercial and industrial affairs." W. L. C.

The New York Machinery Market.

NEW YORK, December 9, 1903.

General conditions are unchanged. Orders are not very numerous, but a large amount of faith in a steady improvement to begin in real earnest about the first of next year is manifest. The statement of a prominent machinery merchant made yesterday characterizes the general feeling pretty well. He said: "Buyers are realizing that the country is not going straight to the bow-wows, even though they may have feared it a few weeks ago." The usual cry that expenditures must be curtailed preparatory to the formulation of annual statements is now being heard on all sides. Then there is a good deal of talk about appropriations for 1903 having been exceeded, and that any unpurchased requirements must go over into next year's appropriation. These features lead merchants to say that they don't expect much business before the first of next year, and they state that, judging from the tenor of correspondence, matters that are being deferred now for these reasons will be consummated early next year.

The remarkable phase of the present situation is the comparatively small amount of price cutting that is being indulged in. Buyers who expected to see values go to pieces have been disappointed. Of course there has been some shading, but on the whole values have been excellently maintained. It cannot be denied that the concerted action of builders of machine tools as regards this question has been largely responsible for the gratifying firmness displayed in all lines of machinery quotations.

The meeting of the prominent builders of milling machines held in Buffalo yesterday was behind closed doors, and for the present information as to the transactions is withheld. A committee was appointed to prepare a statement for publication, which will probably be done within the next week. This move lends color to the belief that the meeting was successful and that something was accomplished. From a standpoint of numbers the meeting was a success, as representatives of practically all of the builders of milling machines were present. Since our announcement of the meeting last week we have learned that the idea was conceived by the builders of this line of product who are members of the National Machine Tool Builders' Association, and that the plan of holding the meeting was launched at their last convention in New York. Its scope was extended beyond the Machine Tool Builders' Association, however, and milling machine builders who are not identified with the latter organization were present at the Buffalo meeting.

A report of a meeting of the Board of Directors of the Landis Tool Company of Waynesboro, Pa., held last Thursday, states that the company intend embarking into wider fields with a new design of grinder. Details as to the nature of the new machines are not given, but the report states that at the meeting on Thursday the directors authorized the building of three new designs of grinders, drawings of which were submitted. The report continues:

"It is the purpose of the company to enter new fields and, with these new grinders, take the place of machines now in shops to perform certain operations. The grinders are for a different purpose than comprehended in the grinding machines now in use. These new grinders are, of course, the invention of A. B. Landis, superintendent of the Landis Tool Company. The annual statement showed assets of $364,139.28. The liabilities included: Capital stock, $241,996.82; bills payable, $48,666.44; personal accounts, $33,411.87; undivided profits, $43,064.15. The total indebtedness of the company, as shown by the statement, is $35,792.55. Since the preparation of the statement at the end of the business year, October 31, the whole amount of the capital stock, $250,000, has been paid into the treasury. A comparative statement has also been prepared showing that the net earnings have advanced from $2502.44 in 1898 to $36,778.79 in 1903. The greatest gains were made in the last three years. In 1901 they were $21,264.79; in 1902, $30,769.17; in 1903, $36,778.79. The total net earnings in the six years of the plant's existence were $120,499.93. The plant depreciation has been $33,728.25 during this same time. The total amount of dividends paid has been $43,048. The largest dividends have been paid in 1900, $6000; 1901, $6000; 1902, $9000; 1903 (to be paid January 1, 1904), $15,000. During the three years, 1900, 1901 and 1902, the company paid Landis Bros., on account of contract, $12,500. These obligations were discharged in full in 1901."

The Landis Tool Company made a large shipment of their Universal grinders to Europe last week. It consisted of six to Berlin, Germany, and four to London, England. One of the grinders is of the largest size, the others medium. The company will ship to London this week what is said to be the largest grinder ever built.

The American Casting Company, Chalifax Building, Birmingham, Ala., have purchased most of the equipment for their new foundry plant. In addition to the machines already ordered, considerably more is to be added later. The following has been purchased: One 28-inch Milwaukee turret lathe for heavy work, fitted with taps and other attachments; one complete tool equipment for facing up to 20 inches diameter and tapping up to 12 inches diameter, embracing 56 different tools, including inserted black taps from 2 to 12 inches, furnished by the Milwaukee Machine Tool Company, Milwaukee, Wis.; boring bars and cutters fitted with reaming tools to handle work from 2 to 12 inches diameter; one 14-inch Le Blond engine lathe with compound rest; one 28-inch Johns drill; two large Diamond grinders; one 30-inch Wright band saw; one 20-inch Greaves & Klusman wood turning lathe; one Fay combination cross cut and rip cut saw; one Oliver wood trimmer; one 2-ton Curtis direct steam elevator, fitted with 6 x 7 foot platform, complete with main and auxiliary valves, traps and safety devices; one No. 9 Buffalo blower; one 48-inch Newton cupola; three Tabor 7-inch power ramming vibrator frame molding machines; one Curtis automatic air compressor, 91 cubic feet per minute capacity; one Wheland horizontal engine; one Chandler & Taylor 14 x 54 inch horizontal tubular boiler; one 48 x 48 x 36 inch tumbling mill, weight 4800 pounds, built from special design by Continental Gin Company, Birmingham, Ala., and one 36 x 48 inch round barrel, built by Northern Engineering Works of Detroit, Mich. Both are fitted with exhaust heads, and tight and loose pulleys. Power is transmitted over three lines of shafting, all independently controlled. An Almond patent quarter turn will be used on the machine shop line. An industrial railway equipped with turn tables will facilitate handling of raw material and finished product. Weighing scales are to be put in at entrance of elevator for weighing up raw material, and a similar arrangement has been put in the stock house for finished product. It is intended to instal an overhead trolley system for pouring and handling castings. The American Casting Company were incorporated in the middle of October with a capital stock of $20,000, but had previously commenced the erection of their plant. This is to consist of a foundry, 50 x 150 feet; machine shop, 60 x 80 feet, and pattern shop. They will manufacture a line of hardware specialties, and make a specialty of flange couplings. Geo. H. Harris is president; H. V. Dimmick, vice-president; Daniel B. Dimmick, general manager, and J. E. Dun, secretary and treasurer.

While it has been generally understood that the Ferracute Machine Company, Bridgeton, N. J., would rebuild their large plant which was destroyed by fire some two months ago, official announcement to that effect was not made until last week. It is the intention of the company to erect a fire proof shop in the spring, plans for which are now under way. Sufficient progress, however, has not been made to determine the size and design of the proposed new building. At present they are working about half their usual force in some temporary shops they have erected and rented. The company have lately been reorganized, the control of the stock having been secured by Oberlin Smith, president and mechanical engineer, who purchased the interests of his brother, Frederick F. Smith, and Dr. Jacob G. Street.

The Hilles & Jones Company of Wilmington, Del., who, as we have previously mentioned, are extending their plant by the addition of a large foundry and a general enlargement of other departments, are now in the market for their power plant equipment. Orders have not been placed as yet for the foundry equipment, with the exception of the cranes, which have been ordered from the Shaw Electric Crane Company of Muskegon, Mich., and 85 Liberty street, New York. There will be five of these, including one each of 40, 20, 10 and 5 tons capacity. Outside of the power equipment the machinery to be purchased will probably come up for decision immediately after the first of the year.

In our last issue we mentioned the fact that the James Cooper Mfg. Company, Limited, of Montreal, Canada, builders in Canada, under license, of Ingersoll-Sergeant air compressors, rock drills, coal mining and quarrying machinery, and also Lidgerwood hoisting and hauling engines, for cableways, &c., had gone into the hands of a receiver. The latter advises us that "it is the intention of this company, under the winding up act, to close out their business by public tender. It is proposed to sell the land, buildings, plant and stock of goods on hand by tender, to be addressed to the liquidator of the James Cooper Mfg. Company, Limited, Montreal, on or before December 28 instant. It affords an excellent opportunity for any American manufacturing company that would look with favor on establishing a Canadian plant for foreign and domestic trade. The trend of public opinion in Great Britain would seem to favor the establishment of Canadian manufacturing plants by American houses. The plant in question has just been completed, and is of the latest and most up to date form of construction as regards buildings and equipment." The plant includes: Machine shop, 100 x 400 feet, containing 20-ton electric crane, boring mills, lathes, planers, milling machines, turret lathes, radial drills, &c.; foundry, 100 x 200 feet, containing 20-ton electric crane with 5-ton auxiliary, also pneumatic elevator, blower, generators, &c.; everything in the above shops operated by electricity; pattern shop, 80 x 160 feet, equipped with modern wood working machinery; forges, 100 x 100 feet, containing two steam hammers of 800 and 2500 pounds, respectively, and five forges; power house, 80 x 160 feet, containing air compressor and a direct connected generator; stock, a large assortment of air compressors, air and steam drills, coal cutters, crushers, hoisting engines, boilers, air receivers, ore cars, ore buckets, &c. (complete and in course of construction). Duplicate parts and general supplies.

The Wolf Company, Chambersburg, Pa., manufacturers of flour mill, rice, corn, rye and special machinery, power transmitting appliances and turbine water wheels, purchased good will, fixtures, patents, patterns, and all tools of Griscom & McFeeley of Philadelphia, Pa., Monday, November 30. The majority of the tools now in the factory formerly owned by Griscom & McFeeley will be shipped to the factory at Chambersburg, Pa., within a few weeks. All export business for the Wolf Company as well as all inquiries from the following States—namely, Maine, New Hampshire, Vermont, Rhode Island, Massachusetts, Connecticut, Delaware, western shore of Maryland, including the following counties in Western Maryland, Baltimore, Anne-Arundel, Calvert, Charles, St. Mary's, Prince George, and the following counties in Pennsylvania, Philadelphia, Delaware, Chester, Lancaster, York, Montgomery, Bucks, Berks and Lebanon, will be controlled from the company's new address. 521-523 North Twenty-third street, Philadelphia. The management of the Export and Atlantic Coast Department will be in charge of Jas. J. Pollard, with W. M. Nissley, a practical millwright, as traveling representative. The Wolf Company have retained Thos. McFeeley, formerly of the firm of Griscom & McFeeley, and have made him manager of sales department. Mr. McFeeley will spend most of his time soliciting contracts and orders for machinery for the Wolf Company, and will divide his time between the Philadelphia branch and the home office at Chambersburg. For the present the company will not require any new machine tools in Philadelphia or at Chambersburg, but they anticipate making some additions to their roll grinding and corrugating plant in Philadelphia later on.

We are advised that the New Jersey Steel Company, who have purchased the plant and business of the Uniform Steel Company of Rahway, N. J., intend doubling the plant.

The Davies & Thomas Company of Catasauqua, Pa., are preparing plans for the extension of their machine shop. The enlargement will necessitate the purchase of a large amount of machinery.

Patterson, Gottfried & Hunter, Limited, 146-150 Centre street, New York, have purchased the entire stock of American steel pulleys formerly carried by the Niles-Bement-Pond Company in New York, and are now the sole representatives of the American Pulley Company in New York City.

Two Steel Construction Office Buildings Placed in Chicago.—Holabird & Roche, architects, Chicago, have let to Wells Brothers Company, general contractors, the general contracts for two large steel buildings on State street. The first of these buildings, to be owned by General Henry Strong, and known as the Adams Building, is on the southeast corner of State and Adams streets, and will be built with a view to its occupancy by many small retailers of dry goods and kindred lines. It occupies a space 100 x 145 feet and is 14 stories high, so constructed that three more stories can be added at will. The contract awarded to Wells Brothers amounts to about $800,000, while the total cost of the building ready for occupancy will be about $1,000,000. The building will require 2500 tons of structural steel, contract for which has not yet been placed. Active building operations will begin March 1. The second large building is the Chicago Savings Bank Building, to be known as the Madison Building, at the southwest corner of Madison and State streets, which will cost about $750,000 when completed, Wells Brothers' contract being for approximately $600,000. The lower floor of this building will be occupied by a bank and upper floors will be fitted up as offices and salesrooms. It will require 1550 tons of steel, contract for which is not placed. Active building operations will being May 1. Subcontracts for both buildings are now open for bids. The same contractors have secured the contract for erecting the Chalfonte hotel at Atlantic City, N. J., to be erected after plans of Addison Hutton, a Philadelphia architect. The steel contract for this building, aggregating 800 tons of structural shapes, has been placed with the American Bridge Company.

HARDWARE.

IT is not an easy matter to forecast the ultimate influence of changes which are recognized as already affecting business. The first effect of any departure from the old way of doing things is almost invariably injurious to some interests, and there is therefore a disposition to deplore the disturbance of the established conditions. Any change of this character, however, which takes place, takes place in the last analysis because it is advantageous to certain parties and at least appears to be on the whole an improvement on former methods. Very frequently, too, those whose interests are injured by innovations which occur are, if sufficiently alert, able to turn them to advantage and to adapt themselves to the new situation in such a way as to make the change contribute to their further success. The ability thus to recognize the trend of things and move with them is one of the qualities that make for large and permanent success in business.

Among the minor influences which affect trade in these days is the trolley, with the changes which it introduces. Many merchants, especially in the smaller towns and villages, in fact in all country districts, have doubtless felt the injurious effect of this new and almost ubiquitous means of transportation. It has drawn customers to new markets and in this way has probably done something to develop the business of merchants in the local trade centers, enabling them to branch out a little further, and has gradually increased their opportunities for extending trade. All this, of course, involves the loss of business somewhere, but on the whole it is unquestionably an improvement in the facilities furnished for the general public, and is therefore to be accepted in a sensible manner by the merchants, who have to reckon with it as a disturbing factor in their business. The practical problem which almost every merchant in the land is called upon to solve is how to make the trolley system serve his interests and increase his business. Any opportunities it gives must be promptly embraced, for in such a matter there is no time for delay. Competition does not wait. If the trolleys, with their movement of passengers and goods, are taking away his trade the merchant must at once consider what can be done to make the trolleys in some way contribute to his trade. There is in such cases more to be gained by recognizing and utilizing the new method than by resisting the tendency or trying to keep things in the old channels. Ingenuity, alertness and renewed enterprise will in most cases find a satisfactory way of solving the problem and extracting good out of the threatened injury. If this is impossible, as is sometimes the case, the merchant has to choose between conducting business under greater disadvantages or boldly embarking in a new field or new enterprise.

In this connection the article which we print in the following columns on the use made of the trolleys and their facilities by merchants in New England, and more especially in Rhode Island, will be suggestive to our readers in all parts of the country.

The exhaustive report of the British Commissioner, just published in England, on commercial conditions in South Africa affecting British commerce, from which liberal excerpts are reproduced in our British Letter in this issue, should be very gratifying and encouraging to American manufacturers and exporters, especially as to American business methods, adaptability of American goods to foreign markets, ingenious and novel articles and approved methods of packing. Mr. Birchenough went to South Africa as an expert in the British interest, and he appears to have discovered that American competitors are already formidable rivals. It will naturally occur to merchants abroad that if the progressive spirit of South African pioneers find in America a profitable source of supply they also in other parts of the world should take the hint and acquaint themselves with American manufacturers. The facts mentioned in regard to freight rates are also interesting and suggestive.

Condition of Trade.

With the near approach of the holidays, trade is naturally in diminished volume, current business being restricted for the most part to purchases needed at once to replenish stocks. These purchases, however, are only for such goods as are actually required, as merchants are restrained by the general tone of the market and also by the coming of stock taking time from adding unnecessarily to their assortments. The changes in prices are in most cases in the line of revision of quotations in the buyers' favor, as inducements are presented in the form of special concessions, slight additional discounts, more liberal terms of delivery, &c., rather than in any open reduction in price. There is a good deal of this gradual revision of prices going on, and many negotiations are in progress with merchants and manufacturers with a view to future business. Some orders are placed with fair liberality under the protection of a price guarantee by the manufacturers. Preparations for inventory are being made by houses who take it at the first of the year, and many of these are also busy with holiday and the special trade that sets in with the opening of decided winter weather. The extent to which the trade are giving attention to goods outside of the strictly Hardware field is illustrated especially in the holiday season, and the result of this state of business is to bring into the store many goods which make popular appeal and render them more attractive to the public. The year draws to a close, having made a good record for itself, and under conditions which, notwithstanding the uncertainty of the future, are not without indications of a substantial prosperity among the people, which should be a potent factor in counteracting the disturbing influences of gradually lowering values.

Chicago.

(*By Telegraph.*)

Little new business is expected by the Hardware jobber between now and the year's end, retailers supplying only their actual necessities with a view to inventorying as small as possible a stock January 1. Satisfaction is expressed by leading interests here at the trade of the year as a whole, and the outlook for a renewal of activity after January 1 is encouraging. No changes in prices are noted and few are expected before January.

St. Louis.

(*By Telegraph.*)

The volume of Hardware sales continue liberal and the jobbers are still on the jump in order to promptly fulfill the requirements of the trade. The situation as regards Wire Cloth is considered of especial interest. The burning of the plant at New Freedom, Pa., will take out of the market possibly 10,000,000 to 12,000,000 feet, and this together with the improvement under way in another large place which will cause a curtailment of this production will mean a reduction in the year's output, possibly 15,000,000 feet. The price to-day is $1.25, which after a careful weighing of the facts may possibly look

cheap a few weeks hence. The demand in the heavy department of the market is said to be much curtailed, and the lower range of quotations for Bars and Structurals has not yet been reflected in the increasing of consumers' requirements.

NOTES ON PRICES.

Wire Nails.—The demand is fairly active for the season, and is confined to present requirements. The delay of Nails in transit has again become quite pronounced on some railroads. The market is represented in a general way by the following quotations, although these figures are shaded in some instances, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

Jobbers, carload lots	$1.90
Retailers, carload lots	1.95
Retailers, less than carload lots	2.05

The following are the present charges, per keg, of the American Steel & Wire Company for Electro, Galvanizing Nails at mill: 2 Penny and larger, $1; smaller than 2 Penny, $1.75; special for 3 and 4 Penny Shingle Nails, 75 cents.

New York.—About the same volume of business is being done, in small lots from store, as for the past month or so. Quotatons are as follows: Single carloads, $2.10; small lots from store, $2.15 to $2.20.

Chicago, by Telegraph.—Business is light, being confined largely to shipments from store in comparatively small lots. Carload business is at a standstill for shipment this month, though some orders are being booked for January delivery. The competitive price on Wire Nails may be said to be $2.05, Chicago, to jobbers in carload lots. Retailers can buy Wire Nails at from $2.10 to $2.15 in carload lots, Chicago, with 10 cents advance for less than car lots. A feature in the Wire Nail business is the competition of the Coated Nail, which is sold here at about 10 cents per keg less than the regular Nails.

Pittsburgh.—Orders for Wire Nails are mostly in carloads and smaller lots, but the volume of business, considering the season of the year, is fairly satisfactory. The general market on Wire Nails is $1.90 in carloads to jobbers, but to some points of shipment the delivered price sometimes represents a slightly lower figure. We quote Wire Nails at $1.90 in carloads to jobbers, $1.95 in carloads to retailers and $2 to $2.05 in small lots, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days.

Cut Nails.—The trade at large are confining their orders to actual necessities, and are not placing contracts for future shipment. The meeting of the Cut Nail Association is scheduled for the 10th of this month. The market is not considered to be especially firm. Quotations are as follows: $1.90, base, in carloads, and $1.95 in less than carloads, f.o.b. Pittsburgh, plus freight in Tube Rate Book to point of destination; terms, 60 days, less 2 per cent. off in 10 days.

New York.—A moderate but steady demand for small lots from store characterizes the market at this point. Quotations are as follows: Carloads on dock, $2.04½; less than carloads on dock, $2.12½; small lots from store, $2.20.

Chicago, by Telegraph.—There is a moderate demand in this market for Cut Nails at $2.06½, Chicago, in carload lots, and $2.11½ in less than carload lots, but buying is of the hand to mouth character. Quotations are as follows: $1.90, base, in carloads, and $1.95 in less than carloads, f.o.b. Pittsburgh, plus freight in Tube Rate Book to point of destination; terms, 60 days, less 2 per cent. off in 10 days.

Pittsburgh.—In view of the general tendency toward lower prices of all kinds of iron and steel products, it is anticipated that Cut Nail manufacturers may make a reduction in prices at their meeting this week. Demand for Cut Nails is only fair and is mostly for small lots, buyers pursuing the policy of placing orders only for actual needs. A slight concession of about 5 cents a keg is obtainable on carload orders. We quote: Steel Cut Nails, $1.90, base, in carloads and $1.95 in less than carloads; Iron Cut Nails, $2, base, in carloads and $2.05 in less than carloads, plus freight in Tube Rate Book to point of destination, 60 days, less 2 per cent. off in 10 days.

Barb Wire.—This season is no exception to the usual light demand, trade being confined to actual requirements. The following quotations fairly represent the market, although there are evidences of shading prices to some extent, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

	Painted.	Galv.
Jobbers, carload lots	$2.20	$2.50
Retailers, carload lots	2.25	2.55
Retailers, less than carload lots	2.35	2.65

Chicago, by Telegraph.—The demand for Barb Wire is naturally light and quotations are still nominally as follows: To jobbers, Chicago, $2.45 for Painted and $2.75 for Galvanized; 5 to 10 cents higher to retailers, and an advance of 10 to 15 cents in less than carload lots. But buyers claim that prices ruling 10 cents lower are freely quoted by competitive interests and are met by the leading producer. Staples in carload lots sell as follows: Plain, $2.30 to $2.35, and Galvanized, $2.70 to $2.75, the outside price being to retailers.

Pittsburgh.—Demand is very quiet, being for small lots only and for actual needs. We quote as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

	Painted.	Galv.
Jobbers, carload lots	$2.20	$2.50
Retailers, carload lots	2.25	2.55
Retailers, less than carload lots	2.35	2.65

Smooth Fence Wire.—Mills continue busy and specifications on contracts are being made quite freely. Prices are somewhat irregular, but the following quotations fairly represent the market, f.o.b. Pittsburgh, terms 60 days, or 2 per cent. discount for cash in 10 days:

Jobbers, carloads	$1.80
Retailers, carloads	$1.85
Less than carloads	1.95

The above prices are for base numbers, 6 to 9. The other numbers of Plain and Galvanized Wire take the usual advances, as follows:

	6 to 9	10	11	12&12½	13	14	15	16
Annealed	Base.	$0.05	.10	.15	.25	.35	.45	.55
Galvanized	$0.30	.35	.40	.45	.55	.65	1.05	1.15

Chicago, by Telegraph.—Though only moderately strong, Smooth Fence Wire may be said to be the most active item in the Wire list. The leading producer continues to quote: Nos. 6 to 9, $2.05 to $2.10 in carloads on track, and $2.15 to $2.20 in less than carload lots from store; Galvanized, 30 cents extra for Nos. 6 to 14, and 60 cents extra for Nos. 15 and 16.

Pittsburgh.—Demand continues fairly heavy, considering the season of the year, and volume of business this year is heavier than last. Prices are only fairly steady, concessions being made on good sized orders. We quote as follows, f.o.b. Pittsburgh, terms 60 days, or 2 per cent. discount for cash in 10 days: Plain Wire, $1.80, base, for Nos. 6 to 9 in carloads to jobbers, $1.85 in carloads to retailers and $1.95 in small lots to retailers; Galvanized, 30 cents extra for Nos. 6 to 14, and 60 cents extra for Nos. 15 and 16.

Paris Green.—For some time manufacturers have been holding Paris Green, in bulk, for spot delivery at 11 cents per pound. Quotations are now being made at the same figure for shipments up to March 15, 1904, in half barrels of from 200 to 400 pounds. It is too early to state whether manufacturers will work in harmony regarding prices for the coming season, but the foregoing price may be an indication of the future of the market.

Cordage.—Demand continues steady, but restricted in volume, which condition will probably rule for the next month or more. The market continues firm in tone, on the basis of 7-16 diameter and larger, and is as follows: Pure Manila, 11½ cents; second-grade Manila, ½ to 1 cent per pound lower: Pure Sisal, 9¼ cents; Mixed Sisal, 8¼ cents per pound.

Glass.—There is more or less confidence expressed in Glass circles that the formation of the Manufacturers' Window Glass Company, by which a central selling

agency will be formed, may be accomplished. It is stated that the membership will include 95 per cent. of the capacity of the country. The Glass workers' unions are exerting their influence to accomplish this end, and have virtually given manufacturers to understand that if they do not affiliate with the new company it will be impossible for them to secured skilled workmen. The market has taken on a firmer tone, and inquiries from the trade are becoming more frequent. Jobbers are also replenishing their stocks by making larger purchases than for some time, although they are experiencing difficulty in getting anything like full assortments of sizes, owing to the broken condition of manufacturers' stocks. When it is considered that some factories stopped making Glass last March, and that by the middle of April no factories were in operation, it will be recognized that such conditions in the market are not strange. Manufacturers are not soliciting business to any extent, and are awaiting the completion of the Manufacturers' Window Glass Company, before announcing prices. Local jobbers are quoting from store at 90 and 5 to 90 and 15 per cent. discount from list of December, 1902.

Paints and Colors.—*Leads.*—Owing to the decline in Pig Lead and Zinc, the National Lead Company have announced a reduction in Lead products, as follows:

White Lead, dry or in oil, Red Lead and Litharge in kegs:

In lots of less than 500 lbs.....7c. net
In lots of 500 lbs. and over.....6½c. net
Dry White Lead in barrels, ½c. per pound less than price in kegs.
Red Lead and Litharge in barrels and half barrels, same as price in kegs.
White Lead in 12½-lb. tin pails (packed in 100-lb. cases), 1c. per pound over price in kegs.
White Lead in 25-lb. tin pails (packed in 100-lb. or 200-lb. cases), ½c. per pound over price in kegs.
White Lead, assorted, in 1-lb., 2-lb., 3-lb. and 5-lb. cans (packed in 100-lb. cases), 1½c. per pound over price in kegs.

Other corroders have made reductions in conformity with the above prices.

Oils.—There is a limited demand for Linseed Oil in small lots, and some deliveries are being made on contract. The market is fairly firm at the following quotations: City Raw, in lots of five barrels or more, 37 cents; in lots of less than five barrels, 38 cents per gallon. Out of town and Western Oil is quoted at 35 to 36 cents per gallon.

Spirits Turpentine.—The receipts at Savannah, it is understood, are readily taken by exporters and the Turpentine Operators' Association. The latter is supposed by some to have sufficient power to regulate the prices of the new crop of Turpentine. It is reported that every effort will be made to keep prices at present high mark at Savannah. The high price of Turpentine is about offset by the lower price of Linseed Oil in the minds of Mixed Paint and Varnish manufacturers, so that no advance may be made in the prices of these lines. The local market is quiet and steady at an advance over last week's prices. Quotations are as follows, according to quantity: Oil barrels, 59½ to 60 cents; machine barrels, 60 to 60½ cents per gallon.

AMONG THE HARDWARE TRADE.

Tillman Hardware Company, Quitman, Ga., have succeeded the Estate of John Tillman. J. B. Tillman continues the management, and the business will be conducted in the future in the same manner as heretofore.

Carter Hardware Company, Mayfield, Ky., have been incorporated with a capital stock of $20,000, to carry on the wholesale and retail business in Shelf and Heavy Hardware, Stoves, Tinware, Agricultural Implements, Sporting Goods, Buggies and Wagons, furniture, &c.

H. A. Bier has bought the Kennewick Hardware Company's stock, at Kennewick, and will continue the business under the same style. Mr. Bier was formerly secretary and manager of the Ritzville Hardware Company, Ritzville.

Whitman & Price have disposed of their Hardware, Stove and Sporting Goods business in Macomb, Ill., to Roy Alden.

W. T. Cropper has bought the stock of Hardware and Agricultural Implements formerly carried by Inglehart & Smith, Dalton, Mo.

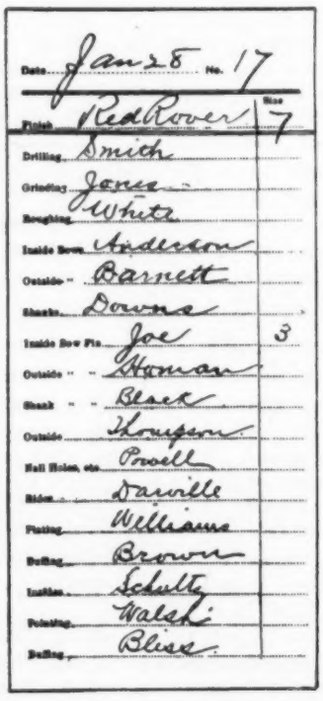
Edward Florance & Co., Humboldt, Minn., have disposed of their Hardware and general merchandise business to Anderson, Matthews & Co.

Stephenson & Lasher, Wymore, Neb., have dissolved partnership, and D. A. Lasher will continue the Hardware, Stove, Farm Implements and Sporting Goods business under his own name.

Aid Hardware Company, West Plains, Mo., have purchased the B. B. Carter Hardware stock.

THE COST SYSTEM OF A SHEAR FACTORY.

IN a Connecticut Shear factory where much of the work is done as piece work, but where the contract system is employed to some extent, the castings for a gross of Shears and two or three overs are put in a box. This box then goes to the different departments where the several operations of making and finishing are performed, the Shears of this box being kept separate from the others in other similar boxes. A card such as is shown in the accompanying illustration is put in the box at the start and follows it around until the Shears are completed. Referring to the card it will be seen that on the top line is given the date when the castings were first put in the box, following which is the number of the box. On the next line is written the name of finish desired, Red Rover, and the size, 7 inches.



The Cost System in a Shear Factory.

Below this are shown the different operations the Shears must go through before being completed. It will be seen from the card that the first operation of drilling was given to Smith, in the next operation of grinding to Jones and so on. The inside bow finish was given to Joe, a contractor, and he gave it to a workman whom he designates as No. 3. As soon as a workman finishes one operation he receives from the foreman a receipt for the work done on the gross of Shears. At the end of the day he turns the receipts into the office and from these the weekly pay roll is made up.

THE USE OF TROLLEYS IN EXTENDING TRADE.

WHEREVER trolley express service has been established its influence has been felt to a marked degree in the Hardware business, in common with other lines of trade. Investigation of what this effect has been develops the fact that the country merchant is getting back through the medium of the new common carrier some of the trade that he has lost through trolley passenger service. This rapid carrier of express packages, and what is generally classified as freight, is becoming a more important factor every day in regions which it is serving. The jobber in the city feels it in increasing business with his country customers. The country merchant is well satisfied with results, and at the same time the city Hardware dealers, the retailers, assert that they can see no harm coming to them. Most important of all, perhaps, is the bettered condition of the farmer, dairyman and market gardener living beyond the 5 or 6 mile circle from the city, who has found a cheap and quick means of getting his products to the city market. He is making more money, and has more money to spend. He is making improvements to his property and building new property. He is buying new and better Tools. He is placed on an even footing with his competitor who lives within easy driving distance of the markets.

Bettered Condition of the Farmer

The trolley express is very much the exception in most parts of the United States. Not one hundreth part of electric railway mileage is so equipped. In the West there are complete systems, and New York State has a number of fine lines equipped with express cars. In New England there are a few such lines, the most complete and best tried of which is that which serves the country round about the city of Providence, R. I., which has been in operation for two years to the mutual advantage of the country merchant, the country buyer and the city wholesaler. The retailer feels it, too, and for the better, so the writer was told by a number of Hardwaremen of the city. But the general opinion is that the best results of all are to the country merchant. The express people themselves say they know this to be so. Their books prove it, they assert.

Country Merchant the Biggest Gainer

The country merchant on the line of the trolley express does business for his neighbors, which he did not do when there was trolley passenger service but no trolley express. Trolley passenger lines had very seriously injured the business of the country store. In some small towns storekeepers have been driven out of business. The people were quick to take advantage of cheap fares to the city, and went there and did their shopping, even their buying of heavier goods, such as Heavy Hardware and the hundred and one things which make up the Hardware stock of the general merchant in the country, or of the Hardware merchant of the towns large enough to warrant specializing in his line.

The combination of the trolley express and a telephone converts the country store into a complete department store. His stock of goods need not be large. It may even be smaller than it was before the trolley express was established. He has his samples, catalogues and price-lists. He has in them the same stock of goods that his jobbers have in the city.

This typical incident illustrates the workings of the telephone-express combination: A farmer drove into a town more than 10 miles out of Providence and called at the country store a few minutes after eight o'clock in the morning. He wanted two kegs of Wire Nails, of different sizes, some Paint and some small Hardware. He also wanted a small part of a Mowing Machine to replace one that had been broken, and he wanted it right away. The storekeeper had none of the desired goods in stock. But he promised to have them at his store before the noon hour. The farmer went about his business, and the merchant called up his jobber in Providence and gave the order, receiving a promise that the goods would be shipped on the express car leaving Providence at nine o'clock. It would be quick work for the jobber, so his clerk called up the trolley express headquarters, and asked to have the car held a few minutes for the goods and this was promised him. The Nails, Paint, Miscellaneous Hardware and a duplicate part of the Mowing Machine were started from Providence at five minutes after nine, and before eleven o'clock were deliverd at the store 10 miles away, ready for the customer who had been doing other business in the meantime, and was not at all inconvenienced because the goods were not in stock when he called at the store in the morning.

How It Works

Had there been no trolley express the chances are that the country storekeeper would have been passed by. He might have been given the commission to buy the goods when next in the city. But there would have been delay. The farmer, wishing for his Mowing Machine part, would more likely have gone into the city after it and have bought the Nails and Paint and other Hardware while there. Such trips have come to be considered very ordinary events where trolley passenger service has been in operation for any length of time. Nowadays, where the trolley express service is running the merchant no longer has to say, "I'll be in the city in a day or two and will look after the goods for you," or "I'll send to Providence and have them out by freight or express," meaning the railroad express service. Instead, he says: "I'll have them here in two hours," or in an hour or perhaps, if 20 or 25 miles out, in three hours.

In Providence the trolley express has two competitors, the New York, New Haven & Hartford Railroad and the Adams Express Company, both of which cover practically the identical territory of the trolley system. The trolley people are doing no cutting of rates. Formerly they charged less than either railroad or express company, but now they follow the same schedules. The minimum rate is 25 cents, which is the freight minimum, excepting where competition comes direct with the Adams Express Company, when a 15-cent rate is charged for very small packages, weighing less than 20 pounds.

Charges

This is the case in Providence. But elsewhere in New England it is planned to operate more cheaply. The Worcester & Southbridge Company, who operate an electric street railway between Worcester and Southbridge, and beyond to Sturbridge, will soon put an express system in operation, the cars being already built. Their plan, as announced, is a sliding scale of prices of from 5 cents upward, according to the weight or size of the package, the price being the same to all points on the line. When this express system is in operation parcels will be carried the 22 miles in an hour and 20 minutes, which is the same schedule as that under which passenger cars are now running. This road is especially important because of the peculiarly isolated position of the town of Southbridge, with its 12,000 people, who have exceptionally indirect railroad service, the average time by steam road to Worcester, the nearest city, being more than two hours. The electric passenger service between the cities has injured the Southbridge merchant, but his turn is coming, according to the Rhode Island experience, when he has the trolley freight to help him. There are hundreds of such instances all over the country.

Other advantages claimed for the trolley express are based on the fact that steam freight and Adams Express must run on the train unit, as against the car unit of the trolley. The railroad cannot hold up a train to await the convenience of a customer. Neither can the railroad run 12 trains a day each way into a suburban district, yet that is the number of round trips that the Providence system averages on its lines.

Other Advantages

At the city end and in large towns the Adams Express Company have the advantage of team delivery to places of business and to residences. The trolley people admit this, but point out that this does not affect the transactions between the country storekeeper and the jobber, because the jobber has his team at one end and the country store is either directly on the line of the trolley road or else is near to it, and has its team anyway.

The word "express," as applied to the trolley, is a broad and comprehensive term. It means a parcel of any size. A mowing machine or engine lathe, a bale of hay or a ton of coal in bags, any one of these is regarded in the parcel sense. In fact, everything that goes through the railroad freight house is carried on the trolley express. The only exception is bulk freight, such as lumber in carload lots and coal and grain in bulk. Yet carload contracts are made by the trolley express people where it is a carload of parcels.

Magnitude of a "Parcel"

In Massachusetts trolley express projects are reported from every section, but a recent act of the Legislature, permitting any street railway to do an express business on its lines if it sees fit, has caused the large systems to hold off, because of the belief that if they put an express service on one of their lines it will be necessary to establish the same service over all their system regardless of whether it would pay or not. The Massachusetts electric companies, with hundreds of miles of suburban lines, would like to put express cars on some lines, but hesitate because others of their suburban lines would not pay; yet if the inhabitants of towns who are not served should go before the Railroad Commissioners and protest that a part of the system was receiving express service while they were not, doubtless the commissioners could compel the express system to be extended so that all might fare alike. This one condition of the law is all that deters the Massachusetts Electric Company from putting on an express system. The same is true of the Worcester Consolidated, who control most of the street railway line of Central Massachusetts.

Lively and Widespread Expansion

So it is all over the country. The trolley express is on the verge of a mighty expansion, which will sooner or later cover the whole vast street railway system. It is possible that the Providence experience as to the beneficial effect upon the country merchant will not be repeated in every instance, yet it would be impossible to convince those who are in closest touch with Rhode Island conditions that the same results will not naturally follow everywhere trolley express is established.

ANDERSON HARDWARE COMPANY.

A RECENT issue of the Atlanta *Constitution* contains an elaborate article on the business of the Anderson Hardware Company of that city. Illustrations are given of the company's handsome and well appointed store building and of the warehouse, aggregating more than 40,000 square feet of floor space, together with portraits of the officers and heads of departments. This business was established by Harvey L. Anderson and associates in 1896, and succeeded the Lowry Hardware Company, organized in 1889. Mr. Anderson entered the employ of the Lowry concern as bookkeeper, and became secretary-treasurer of the company in 1893. He is president and treasurer of the present company, his brother, Andrew L. Anderson, being secretary, and Howell W. Kitchens, vice-president. The business done by the company has grown steadily from the start, and they are looked upon as one of the most substantial and promising houses of the city, as a result of energy and ability of their management. The lines of goods carried embrace a very wide field, and a large wholesale trade is done in connection with their retail business.

SALE OF AXE INTERESTS.

IT is reported on good authority that contracts have been concluded between the American Axe & Tool Company and the Mann Edge Tool Company, Lewistown, Pa., for the sale to the latter company of the Robt. Mann & Sons and Thos. R. Mann & Co. plants at Mill Hall, Pa., transfer of ownership to be made on January 1 next. It is also understood that A. C. Mann and William H. Mann, who have continuously operated the Mill Hall plants for over 20 years, will continue to do so, becoming interested in and officers of the Mann Edge Tool Company. The Mann Company have for a long time been unable to care satisfactorily for their steadily increasing trade, and this purchase would put them in a very much improved position in the matter of output.

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HUBBARD & CO.'S FIRE.

THE many friends in the trade of Hubbard & Co., at Pittsburgh, manufacturers of Shovels, Spades and Scoops, will learn with sincere regret of the destruction of their plant at Sharpsburgh, Pa., by fire. The plant was practically totally destroyed, the loss being estimated at from $150,000 to $200,000, only partially covered by insurance. We understand it is the intention of the firm to rebuild the works as soon as possible on a more extended scale. In the meantime they ask the indulgence of the trade for delays in filling orders until their affairs have been arranged.

THE SOLID STEEL TOOL & FORGE COMPANY.

THE business of the James H. Baker Mfg. Company of Pittsburgh, with works at Avenue, Pa., manufacturers of Wagon Hardware, Drop Forgings and Car Forgings, and that of the Solid Steel Tool Company of Chicago, manufacturers of Railroad Track Tools, has been merged into one concern, to be known as the Solid Steel Tool & Forge Company, with main offices in Farmers' Bank Building, Pittsburgh, and principal sales agency in Chicago. The officers of the new concern are: H. W. Armstrong, president; H. M. Brackenridge, vice-president; Reuben Miller, Jr., secretary and treasurer. The capital stock of the new company is $300,000. The plant of the Solid Steel Tool Company has been removed from Chicago to Avenue, at which place their business of the manufacture of Track Tools will be carried on by the new concern. The business of the James H. Baker Mfg. Company, in the manufacture of Car Forgings, Drop Forgings and miscellaneous lines to specification, will also be continued by the new corporation. The combined works at Avenue Station, on the West Penn Division of the Pennsylvania Railroad, have recently been very much enlarged to carry on the new lines of manufacture. In addition to maintaining branch offices at 1113 South Jefferson street, Chicago, the Solid Steel Tool & Forge Company also have agencies in New York and San Francisco.

EDWARD F. ROSS, Clinton, N. Y., who represents the Atha Tool Company, Newark, N. J., and has a wide acquaintance among the Heavy and Shelf Hardware trade of the principal distributing centers of the Middle West and Pacific Coast, is at present in New York, having recently returned from an extended trip. In connection with the sale of the products of the company with which he is identified, Mr. Ross is desirous of taking up the sale of another line of goods and representing the manufacturers to the larger trade in the territory he covers. He refers hopefully to the outlook for business, inasmuch as stocks are being depleted and the conditions seem to promise a good demand in the near future.

The Hardware business in Battle Creek, Mich., established more than 20 years ago by the late Chas. F. Bock will be continued under the same style, Chas. F. Bock & Son, Frank F. Bock acting as manager for the estate.

FACTORY COST AND BUSINESS METHODS.

SELF-PROVING COST SYSTEM OF BRIDGEPORT BRASS COMPANY.

BY GUY P. MILLER.

In the following article the company's method of keeping the accounts of the various departments is concluded, and a description given of their form of report with information in regard to other uses of their system.

Concluding Article.

MONTHLY SUMMARY OF DEPARTMENT EXPENSES.

THE charges to various manufacturing departments are totaled and grouped by the months, Fig. 41, so that various items of expense may readily be compared from month to month.

MONTHLY REPORT OF TOTAL COST OF EACH MANUFACTURING DEPARTMENT.

The total cost of running the manufacturing departments is reported monthly, Fig. 42, with percentage of factory expense figured against the productive labor. The productive labor is obtained from the cost analysis sheets. Fig. 34, the totals being taken off by means of a comptometer. The totals of factory expense items are secured from analysis sheets, Fig. 40, after proportioned charges are added. In the illustration, Fig. 42, expense charges of departments 26 and 27 are separated from expense labor O. D., as departments 26 and 27 are productive departments and expense labor (O. D.) includes charges of expense departments only.

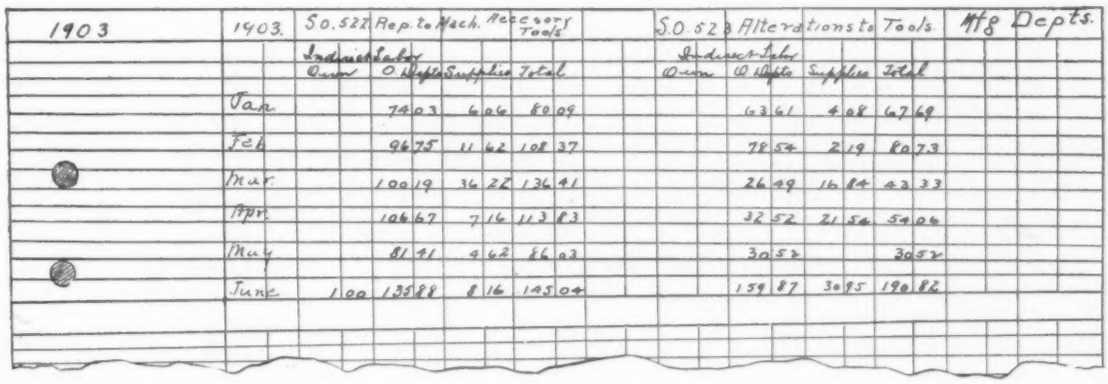


Fig. 41.—Monthly Analysis and Summary of Indirect Labor Charges in the Various Departments. Size of Sheet, 24 by 10 Inches.

METHOD OF RECORDING FACTORY COSTS.

The forms on which costs are finally complied are printed exactly like the estimate forms, Figs. 10, 11, 13, 14 and 15, except that they are colored yellow instead of white, and the words "Factory Costs" are printed in place of the word "Estimate." One of these forms is shown herewith in Fig. 43. In making up the costs the record of material used is obtained from the completed order, Fig. 19; the direct labor from cost analysis sheets, Fig. 34, and the average factory expense from the factory expense reports, Fig. 42. The triplicate orders, which are the same form as duplicate orders shown in Fig. 20, and which are received by the factory accounting department from the finished stores department, are priced from the cost sheets and the total cost of shipments reported to the commercial accounting department, on a journal voucher, Fig. 44, to be credited to stock in process account.

MONTHLY COST OF SHIPMENTS.

The principle mentioned in the beginning of this article, of charging out the oldest receipts first, is carried out in making up the monthly cost of shipments. Starting with an inventory of stock in process, this is subdivided to cost of material, of direct labor and of indirect labor and supplies. Material is credited to stock in process account at the inventoried price until the weight inventoried and the value thereof have been accounted for. The receipts for the first month after the inventoried date are next accounted for in like manner, and so on through the year. The value of indirect labor and supplies, or the factory expense, in the initial inventory are accounted for on the same principle, and the factory expense for months thereafter is then accounted for. As the direct labor is all posted to order numbers, the exact amount to figure on each article is, of course, obtained from the cost analysis sheets.

FORM 1.

FACTORY EXPENSE REPORT, Dept. Mfg., Month ending June 30, 1903.

Pay Roll Balance.

Prod. Labor Own,	$ 10000.00
Prod. Labor Charges to O. D.,	14.00
Expense Labor Own,	6000.00
Expense Labor Charges to O. D.,	24.00
" Salaries Own,	400.00
.....Balance,	10.00
Department Pay Roll,	16448.00
Prod. Labor Charges by O. D.,	30.00
Expense " " " O. D.,	2100.00
Perm. Inv. " " O. D.,	50.00
Gross Factory Pay Roll,	$ 18618.00
Prod. Labor Charges to O. D., 14.00	
Expense " " " O. D., 24.00	
Total " " " O. D.,	24.00
Net Pay Roll,	$ 18594.00

Factory Expense Recapitulation.

Expense Labor (Own)	6000.00
" Salaries (Own)	400.00
" Labor (O. D.)	2100.00
" Accounting (Office Pay Roll)	300.00
" Charges of Dept 26	12.00
" " " Dept 27	10.00
" Supplies,	1000.00
" " S. O. 9011	25.00
Total Factory Expense,	9847.00

Prod. Labor (Own) + Prod. Labor by O. D.—Prod. Labor to O. D. = 10006.00

Total Factory Expense = 98.4% of Prod. Labor.

Prod. Pay Roll for 12 mos. ending June 30 = $ 100000

Expense " " " " " " = 11000

Average Factory Expense for 12 mos. ending June 30 = 11.0 %

All Standing Orders included in Factory Expense, except S. O. 1-10-20.

Prod. = Productive.

O. D. = Other Departments.

Fig. 42.—Monthly Report of Cost of Running the Manufacturing Departments. Size of Sheet, 8 by 10 Inches.

THE ADVANTAGES OF CORRECT COST SYSTEM.

It is very hard to figure the saving made by means of an accurate cost system, but the expense of such a system is nominal compared with the results, the cost of the factory accounting being about 1½ per cent. of the factory payroll. The advantages of a monthly profit and loss statement, and of knowing where and how profits are made, cannot be secured without a system of costs and perpetual inventory accounts susceptible of proof.

It may be added that the amounts shown in the different forms used throughout this series of articles are not relative to each other, as none of them represent actual figures.

The credit of laying the foundation for the system described in this series of articles is due to Gunn, Richards & Co., production engineers, 30 Pine street, New York.

GUY P. MILLER.

THE SCHATZ HARDWARE MFG. COMPANY, Mt. Carmel, Conn., expect to move their plant about March 1 to Chappaqua, N. Y. They have taken over the entire plant, tools, machinery, &c., of the Acme Ball Bearing Company, and will continue to manufacture their line of goods, embracing A. B. C. Casters, Jacks, &c. With the additional machinery and the combination of the two plants the company will be in position to manufacture or make anything in the line of Hardware Specialties, Sheet Metal Stamping, Drop Forging, &c. They are also completely equipped to do any kind of Polishing or Electro Plating. They will also make a specialty of experimental work and perfecting inventions and the drawing of fine and difficult articles in sheet metal. All the company's goods are catalogued by their New York office, the Smith & Hemenway Company, 296 Broadway, in their "Green Book of Hardware Specialties." The latter will continue to market their product with the addition of the A. B. C. Casters and Jacks.

HAMMOCKS AND ACCESSORIES.

I. E. PALMER, Middletown, Conn., manufacturer of Hammocks and a complete line of Accessories, will present a number of novelties to the trade for the coming season. The Palmer plant is probably the largest in the world in the manufacture of Hammocks, the entire plant occupying over 100,000 square feet. Everything, as far as practicable, is handled directly from raw material, starting with the raw cotton in the bale. The plant includes a spinning department of the most recent and improved construction, which provides for the conversion of cotton into yarns, which are particularly adapted for Hammock weaving, and which cannot readily be purchased in the open market. A complete dyeing and finishing establishment is included in the plant, allowing facilities for experiments to produce the most desirable and fastest colors and the application of strengthening processes to yarns. An extensive machine shop is also in operation in connection with the factory, and much of the machinery is either here built or fitted with special patented appliances to adapt the looms to the particular work required of them. Many carloads of lumber are annually worked up through a complete wood working and turning department into various appurtenances for Hammocks and Bed Canopies. The business was established in its present location about 40 years ago, and has undergone a gradual and healthy growth. There are a number of novelties introduced in the line of Hammocks for the coming season, such as patented designs and new weaves, all of which are illustrated and explained in a catalogue illustrated in colors recently issued. A machine embroidered Hammock is among the novelties in weaving. In the line of Hammock appurtenances a great many positions for Hammocks are provided for. There are Hammock supports with awnings and mosquito bars for lawn use; supports for indoor use, and a very simple attachment, offering the utmost ease to be secured from a Hammock, known as a trapeze bar. In addition to Hammocks, there are also manufactured considerable quantities of Mosquito Netting, Minnow Netting, Horse Fly Netting and other cotton textiles. A complete line of Mosquito Canopy Bedstead Supports are also being introduced this season, one of these being made with clamp. This clamp is designed to be attached to either vertical or horizontal rods, and consists of two threaded hooks with a pinch piece, cap and thumb nuts. The threaded hooks, by means of the thumb nuts, hold the pinch piece against the bed rod, and at the same time hold the cap clamp against the support rod, retaining it in any desired position. A number of new patents have the past season been granted to Mr. Palmer on his new line of Canopies and Canopy Supports, covering which line a special catalogue will be issued in about two weeks.

FORM 139

Factory Cost No. 702

Article Brass Parlor Table

Parts	Tools	Supplies	Labor	Net Metal
Plate	32 00		1 32	12 77
Stud			4 12	2 52
Assembling	4 00	56	1 62	
	36 00	56	3 17	15 29
		Shop Labor		3 37
		Factory Exp.		3 70
		Sundries		50
				22 86
		Tool Room		1 80
				24 66

Fig. 43.—Form in Which Manufacturing Costs Are Entered and Filed for Reference.

PRICE-LISTS, CIRCULARS, &c.

Manufacturers issuing new catalogues or price-lists are requested to send to THE IRON AGE *two copies—one for the Catalogue Department in the New York Office, and one for the Iron Age Library of Trade Literature in London.*

TUCKER & DORSEY MFG. COMPANY, Indianapolis, Ind.: Catalogue of Hardware and Wooden Ware Specialties, including Alarm Tills, Folding Saw Bucks, Vegetable, Slaw and Kraut Cutters, Towel Rollers and Racks, Clothes Racks, Lemon Squeezers, &c. Among new goods which will be ready about the first of the year are the Boss Bread and Meat Slicer, Spice Cabinets, Salt Boxes, and Ticket Marking Device for the use of retail merchants in pricing metal pin tickets. The company have just completed one of the best equipped factories for the manufacture of their line of goods in the West.

PHŒNIX CASTER COMPANY, Indianapolis, Ind.: Catalogue of the Martin, Boss, Tucker and Stengel Anti-Friction Casters. They are now making preparations to put on the market Dorsey's Rubber and Leather Tire Brass Plated Caster, for which special claims are made.

BRANCHVILLE ICE TOOL WORKS, George B. Gruman, Branchville, Conn.: Catalogue 1903-04, illustrating, with prices, Ice Plows, Markers, Scrapers, Forks, Bars, Hooks, Tongs, Axes, Balances, Hasp Locks, Hoisting Top Gins, Refrigerators, &c.

THE ELLIOTT & REID COMPANY, Richmond, Ind.: Catalogue relating to their Royal Spring Steel Fencing. This Fencing is of the square mesh type, consisting of horizontal bars which are coiled or kinked to provide for contraction or expansion, and held in position by vertical stay wires. By this system, it is stated, much heavier wire can be used, producing a Fence of exceptional durability. When properly made, it is remarked, it should stretch anywhere without buckling, every bar doing its

FORM 221.

Journal Voucher Date June 30-1903 J. V. No. 1217

AUTHORITY.	ACCOUNT	CARD	DEBIT	CREDIT
John Smith	Debit Sales General		$75,000 00	
Head of Cost Dept	Credit Stock in Process			75,000 00

Cost of all shipments of manufactured goods during the month ending June 30/03

Fig. 44.—Journal Voucher Giving to Commercial Accounting Department Cost of Manufactured Goods Shipped.

full duty. The company are installing machinery at their plant which will nearly double their output of this Fencing. They are running full time and expect soon to run double turn.

BOSTON WOVEN HOSE & RUBBER COMPANY, Cambridge, Mass.: Unique four-leaf catalogue, showing the combinations possible with their Brass Hose Nozzle, from full stream, coarse shower and fine mist to complete shut off by simply turning the wrist.

BROWNE & SHARPE MFG. COMPANY, Providence, R. I.: Illustrated description Catalogue No. 105 showing large lines of Machinists' Fine Tools, Rules, Squares, Micrometer Calipers, Gauges and numerous accurate test Tools. Attention is called to various new Tools on 26 pages, involving new styles, new sizes and some reductions in price. There are over seven pages of index for quick reference.

HARDWARE STORE WINDOW DISPLAY.

BY W. F. BURBANK.

THE windows of a Hardware store are a reflection of the enterprise of the men behind them. There may have been a time when windows would take care of themselves, but not now. Hardly a subject connected with the success and progress of a business needs as much study as the art of trimming a show window. It is an art, and if it is to be a means of bringing dollars it must have as much attention as the ledger. It may often be difficult to trace business to newspaper advertising, but one has evidence every day of the efficacy of show window advertising.

HAVE CLEAN WINDOWS.

Do not be discouraged if the windows are too small. Just as good results may be obtained and it makes possible more frequent changes, which are the means of drawing attention oftener to the store. The first and foremost requirement for an attractive window is having the glass clean. The weekly or semiweekly deluge with the hose is not enough. The hose is all right, but it must be followed up with cloth and chamois until the window is spotless.

AVOID REFLECTIONS.

Next in importance is having every part of the interior of the window visible from the sidewalk. Many good windows are spoiled by shadows or reflections so that at some times in the day goods cannot be seen from outside. This can be remedied by the use of proper backgrounds. I had one window, the interior of which was obscured in the afternoon by the reflection of glass from across the way. I tried several colors and finally a yellow burlap on the side wall solved the problem. On another window black had to be used.

THE CONSTRUCTION OF WINDOW.

A window which is entirely cased in is advocated by many, because it excludes dust. One entirely open is

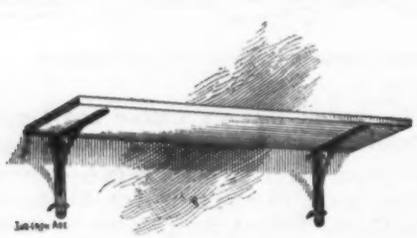


Fig. 1.—Removable Shelf in Side of Window.

to be preferred, as it does not lessen the light in the store. In a small window a neat curtain across the back produces a good effect. By that is meant a draw curtain about 3 feet wide and made so that it can be easily taken down. An arrangement of removable shelves for the sides of the window can be easily made. Take screw hooks that have the straight right angle bend and put them in in pairs, so that there is just room to slide a steel shelf bracket behind them next to the wall. Two pairs of hooks will hold a bracket, as shown in Fig. 1. The shelves can then be taken down in short order.

WINDOW STANDS.

Build platforms and stands for the windows. Fig. 2 shows a platform we had made for a large window. The window is 10 feet wide and 12 feet deep. The platform is 4 feet high and the shelves 12 inches high. It was made in three sections, so that it might be taken out of the window easily. These sections can be used separately to good advantage.

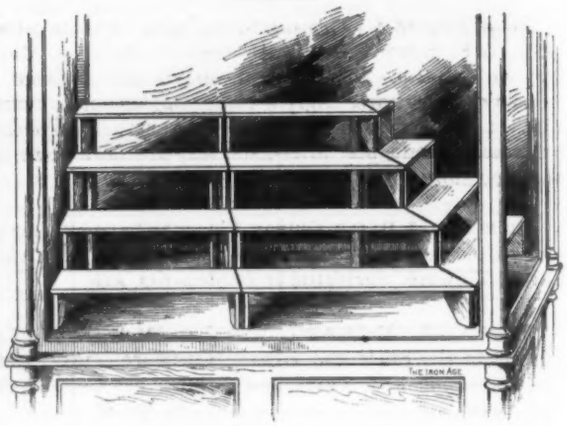


Fig. 2.—Stand in Three Pieces so as to Be Easily Removed from Window.

LIGHTING THE WINDOW.

The lighting of windows is another problem. If electricity is used, a row of lights at the top of the window directly back of the glass, with reflectors, will flood the window with light and not obstruct the view. With gas a jet for every foot of length in the window is not too much, and there should also be reflectors.

DISPLAYS.

In trimming our windows we use crepe paper to very good advantage, and some of the colors lend themselves finely to the display of Hardware. Under ordinary circumstances it is not wise to put in a jumble of goods in the window. Have one line. A Paint window, a Kitchen Ware window, a Cutlery window and so on. A demonstration of the use of some household article is one of the best window displays. For instance, a demonstration of the work of a Meat Chopper will draw well and sell Choppers. Carpet Sweepers can be shown in the same way.

I do not believe in marking goods in the window as a rule. Special sales and new goods are excepted. Try a 25-cent window some time. Get together everything that can be thought of at that price and fill the window. A prominent sign will do the rest.

FROM the paragraph in our last issue, in which reference was made to the resignation of D. P. Hale, Sandersville, Ga., as representative in the South of a prominent New England manufacturing concern, the inference was drawn by some that Mr. Hale had retired from the Hardware business. This, however, is far from being the case, as Mr. Hale expects to continue to be identified with it quite as actively as heretofore. He refers to the giving up of the agency in question as a mere incident, representing, as it does, about one-tenth of his business, and will promptly replace it with another line. Mr. Hale is president of the Sandersville Bank and vice-president of the Farmers' Oil & Guano Company, but his attention to these interests is simply of an advisory character.

Rutherford Hardware Company, Springfield, Mo., have been incorporated with the following officers: Fred. Platte, Sr., president; Ed. V. Williams, vice-president; Fred. Platte, Jr., secretary and treasurer. The company will carry Builders' Hardware, Tools, Cutlery, Sporting Goods, Paints, Oils, Agricultural Implements, &c.

REQUESTS FOR CATALOGUES, &c.

The trade are given an opportunity in this column to request from manufacturers price-lists, catalogues, quotations, &c., relating to general lines of goods.

REQUESTS *for catalogues, price-lists, quotations, &c., have been received from the following houses:*

FROM TURNER & SCHWARZENBERG, who have purchased W. A. & F. Bower's Hardware stock at Methuen, Mass., and will continue the wholesale and retail business in Builders' Hardware, Agricultural Implements, Paints, Oils, &c. This will be run as a branch of their Lawrence business. Catalogues, price-lists, &c., are desired at the Methuen store.

FROM BELL & BATES, Quincy, Fla., who have lately commenced the retail business in Shelf and Heavy Hardware, Stoves, Tinware, Agricultural Implements, &c.

FROM C. K. MCDOWELL, who has lately established himself in the Shelf and Heavy Hardware, Stove, Agricultural Implement, Paint and Vehicle business at Del Rio, Texas.

FROM GRAHAM, JOSS & CO., Powhattan, Kan., who have succeeded S. Bredahl in the Hardware, Stove, Agricultural Implement, Paint and Sporting Goods business. The new proprietors have also added furniture, queensware and wall paper.

FROM F. A. ARGUE & CO, who have bought H. N. Joy's Hardware business at Hamilton, N. D., which was established in 1882.

FROM W. F. FILBERT & CO., Stockholm, S. D., who have succeeded Telscow Bros. in the Hardware and Implement business at Twin Brooks, which will be run as a branch store.

FROM SMITH & MCCORMICK, Villisca, Iowa, who will commence business January 1, when the present separate stocks of J. L. Smith and R. I. McCormick will be consolidated under the above style. The lines handled will embrace Shelf and Heavy Hardware, Stoves, Tinware, Agricultural Implements, Sporting Goods, furniture, &c.

FROM COCHRAN & PICKINS, who have recently succeeded Cochran & Baker, at Marion, Ky.

FROM KENDALL BROS., who have bought the Hardware business formerly conducted by J. R. West at Gas City, Ind.

FROM STEVENS & BREWER, who have succeeded G. D. Stevens, Argos, Ind., Mr. Brewer purchasing a half interest.

FROM PULLMAN HARDWARE STORE, Pullman, Wash., who have acquired the business formerly conducted by Devenish Hardware Company. The new proprietors will discontinue the Machinery and Vehicle lines, and will confine themselves exclusively to the general Hardware business.

FROM C. L. WOOD, who has lately established himself in the Hardware business at Fletcher, O. T.

FROM COATESVILLE HARDWARE & HOUSE FURNISHING COMPANY, Coatesville, Pa., who have purchased the stock of the Atlantic City Hardware Company, and are now ready for business. J. W. Gray is sole proprietor of the new concern.

FROM LEACH & GOSSARD, who have bought H. Blanchard's Hardware, Stove and Paint business at Bloomfield, Neb.

FROM S. B. MARSH, who has succeeded Humphreys & Richards in the Hardware and Farming Implement business at Grafton, Neb.

FROM BOLDS HARDWARE COMPANY, who have lately entered business at Van Buren, Ind., handling Shelf and Heavy Hardware, Stoves and Tinware, Paints and Oils, Sporting Goods, &c.

FROM BLADE & NELSON, who are successors to Finley & McCormick in the Hardware, Stove, Paint and Sporting Goods business at Stanton, Iowa.

FROM CLUM BROS., who have bought the Bidwell & Koler general Hardware and Implement business at Severy, Kan.

FROM HARKRADER & KRIDLER HARDWARE COMPANY, who have succeeded Hopper Hardware Company at Pratt, Kan.

FROM W. M. HINDE HARDWARE COMPANY, Fairfax, Mo., who have purchased the business formerly carried on by Butler & Wright.

FROM NOXUBEE COUNTY HARDWARE COMPANY, Macon, Miss., who on the first of January will succeed Stokes-Evans Hardware Company, wholesale and retail dealers in Hardware, Steam Fittings, Paints and Oils, Agricultural Implements, Mill Supplies, Sporting Goods, furniture, &c. The new corporation will be chartered under the laws of Louisiana, and will have a capital stock of $25,000, paid in. W. E. Stokes of the present firm will retire from the active management of the business and will be succeeded by T. J. Evans. The new company are now in the market for Nails, Wire, Poultry Netting, Wagon and Buggy Material, Shelf Hardware, Tinware, Leather Goods and Saddles.

FROM R. L. EBERTS, Plattsburg, Mo., whose stock was recently destroyed by fire. Mr. Eberts' collection of catalogues, price-lists, &c., was also consumed, and as he is putting in a new and complete stock of Hardware, Stoves, Tinware, &c., he will appreciate copies of the latest catalogues and other printed matter relating to these and allied lines.

FROM LEE & NUCHOLS, who will establish a wholesale and retail Hardware business January 1, 1904, at Johnson City, Tenn. They are desirous of receiving illustrated catalogues, with quotations, of a general line of Hardware. They will also put in a fair stock of china and crockery, of which they would like trade literature and prices. Both E. W. Lee and Charles Nuchols have been with the Winchester Repeating Arms Company, New Haven, Conn., Mr. Nuchols for nearly three years, and before that with George Brown, Knoxville, Tenn. Mr. Nuchols will still continue his connection with the Winchester Company, Mr. Lee, however, devoting his entire time to the business and being its active head.

HOLIDAY TRADE.

SAMUEL MCKNIGHT HARDWARE COMPANY, Allegheny, Pa., issue a neatly printed pamphlet entitled "Holiday Reminders," in which a list is given of numerous goods in the Hardware and allied lines of a holiday character. Most of the pamphlet consists of blank ruled pages for memoranda. The following address to the public appears on the first page:

> *In this Reminder we take the opportunity of presenting a partial list of holiday goods displayed by us this year, and trust it will contain valuable hints to aid you in the selection of articles appropriate to the season.*
>
> *At the same time we call your attention to our complete equipment for furnishing Builders' Hardware for office buildings, banks, residences, &c., and invite a call of inspection, which will convince you that our line is unexcelled.*

BRITISH LETTER.

Offices of *The Iron Age*, Hastings House, Norfolk St., London, W. C., November 28, 1903.

The Week's Hardware Trade.

THE bulk of the Christmas trade from the manufacturer's point of view is generally completed by the end of November. December is generally devoted to filling up stray orders and meeting unexpected demands. The whole tenor of trade this autumn has been exceedingly discouraging. In the season trades devoted to the manufacture of Christmas specialties, November and December are regarded as bumper months, in which overtime is worked and high wages obtained. All that can be said for this year is that trade, instead of being brisk and under pressure, has maintained a certain regularity. If it is only regular when it ought to be abnormally busy, what are we to expect next year? These remarks apply just as much to the lighter trades in Sheffield as to the Hardware manufacturers in the Midlands. There are firms in the Cutlery and White Metal industries who say they do not remember a year when, so near Christmas, trade with the home market was so quiet. Every department should now be in full swing, and in some overtime should be going on. Such, however, is not the case now. There is still an increasing disposition on the part of distributers to rely upon manufacturers to supply whatever they may require at the shortest notice.

This week and next are held the annual Stanley and National Shows, which are devoted to Cycles and Motors. A fair sprinkling of probationary orders has already resulted, particularly in Motors and Motor Cycles, but it is quite too soon to hazard any opinion as to the prospects of the Cycle and Motor trades next year. There is a steady increase from week to week in the number of men engaged in the military small arms branch, and, so far as the home trade is concerned, this is really all that can be said.

On overseas account merchants and factors report themselves busy, but there is a distinct shortage of indents. From Australia and New Zealand satisfactory orders are coming to hand, but the South African situation is at the present moment almost gloomy.

A fair weight of Hardware is being shipped to China, Japan, India and other Eastern countries, and the trade in South America still continues healthy.

Reports on Hardware Lines.

The following report on the state of employment in the Hardware and metal trades indicates clearly the present state of affairs. If anything, later reports are more disquieting:

Brass Work.—Employment generally is reported as fair, but worse than a month and a year ago. In Birmingham it is bad in the Bedstead branch, and moderate with Fender makers. At Rotherham casters and finishers report an improvement. At Leeds and Doncaster employment is dull.

Nuts, Bolts, Nails, &c.—Employment is moderate in the Nut and Bolt trade at Birmingham, but is good in the Wolverhampton district. In Birmingham and Halesowen employment is quiet with Spike and Rivet makers. Wire and Cut Nail makers in Birmingham report employment as quiet, makers of Wrought and Frost Nails at Halesowen as fair.

Tubes.—In the Tube trade in Staffordshire employment generally is slack.

Chains, Anvils, Vises, Anchors, &c.—Employment is reported as fair with makers of Block Chains at Cradley Heath, but as slack with Makers of Dollied and Side Welded Chains, Cable Chain makers and strikers. Chain makers and strikers at Gateshead and Winlaton report employment as fair. Employment is fair with Anvil makers, but with Vise makers at Dudley it is bad; Anchor smiths also are slack. Employment in the Spring trade at West Bromwich is reported as fairly good. In the Wolverhampton district employment is slack with Buckle, Case Hame and Cart Gear makers, and at Walsall with Bit and Stirrup makers. At Wednesbury it is fair with Spring and Axle makers, but bad with Coach and Carriage Iron workers.

Locks, Keys and General Hardware.—With makers of Locks, Keys and Latches employment is good at Wolverhampton and Willenhall, also with Wrought Iron and Steel Hinge makers at Birmingham. In the Hollow Ware trade employment is moderate at Birmingham, quiet at West Bromwich, short time being worked; fair with Light and Stamped Hollow Ware workers at Wolverhampton; slack with Hollow Ware stampers at Sheffield. At Wolverhampton it is good on Electrical and Malleable Castings, Vermin Traps, Brazil and Plantation Hoes, and with piercers and stampers; and it is fair with Spade finishers and Fork drawers, slack with Spectacle Frame makers.

Files, Edge Tools, &c.—File makers in Birmingham report employment as fairly good, Edge Tool makers as moderate. At Wolverhampton it is fair with Filesmiths, good in the Edge Tool trade. In Sheffield these trades are slack, but at Warrington Filesmiths report employment as good.

Cutlery, &c.—At Sheffield employment in these trades is slack, only the Pen and Pocket Blade forgers reporting it as good. At Redditch Needle trade workers report employment as fair, Fish Hook makers as good.

Wire Work.—Employment with Wire weavers is reported as good in London, Manchester and Bristol; as bad at Birmingham, Warrington and Glasgow. With Wire workers it is good at Glasgow, but quiet in London, Sheffield, Manchester and Oldham.

The Official Report on Future Prospects in South Africa.

There is so much detailed material relating to the Hardware and metal trades in South Africa in the Birchenough report, which has just been issued, that I am sure readers of *The Iron Age* will prefer as full extracts from it as space permits without any comments of my own.

AMERICAN LOW FREIGHTS.

American trade has undoubtedly been greatly stimulated by the low freights at which British steamship companies have lately been carrying goods from New York to South African ports, as compared with the prices charged from British ports to the same destination. These low freights are the result of a struggle between the Conference lines and the Prince and Houston lines, which began in June, 1902. It is by no means the first of such struggles. Fomerly the direct trade between the United States and South Africa was conducted by means of sailing ships. When steamers began to be used freights were dropped, in order to drive sailing ships off the seas. As soon as this was accomplished prices were put up. The same thing occurred when the Hansa line began to compete, and now it is repeated with the Prince and Houston lines. For many months cargoes were carried from America at an all round price of 10 shillings per ton. When this is compared with British rates varying from 25 shillings to 42 shillings 6 pence per ton, it will be seen what a serious advantage has been conferred upon American trade. At the present time American rates are advancing again, and before the end of May had reached 17 shillings 6 pence to 21 shillings per ton, but they are still very much below the charges made to British shippers. It is, of course, contended by the steamship companies that these are special "freight war rates," and that as soon as the struggle is decided one way or the other there will be a return to normal rates, which are practically the same between New York and South Africa and Great Britain and South Africa. Many importers, however, complain that even with equal rates the system of classification in force is permanently in favor of American produce and manufactures. Identical classification is highly desirable. There can be no question whatever that the 10-shilling rate, which was in operation for nine or ten months, was the cause of very large importations from America. It has been stated repeatedly by merchants and by Chambers of Commerce in each of the colonies that it had brought into South Africa articles of American manufacture which would not otherwise have found their way there for years. Tempted by low freights, merchants not only filled up their stocks of heavy articles, such as Stoves, Agricultural Implements, Tools, Wire, &c., but made up cargoes with any produce that seemed likely to sell. In the metal and machinery trades, where competition is very keen, and British and American rivalry is very close in quality and price, the effect has been most serious. In the engineering trades there are cases of the amalgamation of British and American firms. Their South African representative sends the orders he takes to the American or to the British branch according to circumstances.

AMERICA'S NATURAL ADVANTAGES.

The possession of an ample and varied supply of cheap lumber gives the Americans a great advantage both in price and quality, in all articles in which wood is largely used, such as Carts, Carriages, Hand Carts, Trolleys, Rims, Spokes and Hubs for Wheels, Churns and other Agricultural Appliances, and most of all "knock-down" or rough furniture. The latter is rapidly becoming a very important article of sale in all parts of South Africa. In other trades the ingenuity and inventiveness of the American people constitute an initial superiority. This is shown in various branches of Hardware, and especially in Steel Tools and small machines, such as Typewriters, Sewing Machines, Cash Registers, &c. The Americans are constantly introducting novelties to save labor and multiply conveniences, and with these they naturally tempt colonial buyers.

Another great advantage the Americans enjoy, though it can perhaps hardly be called a natural advantage, lies in the fact that their manufacturers have had in their own country to deal with, and to provide for, conditions very similar to those which prevail in South Africa, so that they come into the market with an experience which the British have slowly to acquire. This has helped them immensely, and indeed has secured for them the lead in Agricultural Implements, in some departments of gold mining machinery and in steel frame construction.

SUPERIOR AMERICAN BUSINESS METHODS.

Americans study very closely and carefully the local conditions and special requirements of the South African market, or, to put this in another way, the adaptation of their manufactures to the precise use and work which is demanded of them. For instance, in Agricultural Implements, by keeping a close watch upon changing conditions, they keep pace with the wants of their customers. Before the Boer War was over they realized that draft animals would be scare when farming operations were resumed, and immediately put on the market much lighter Plows, which could be worked by smaller teams. In Mining Machinery they recognize the limited life of a mine, and supply Hauling and Mill Engines which will work efficiently for the length of time they are likely to be required, with just a safe margin. The result is a much lower price than is quoted by British firms for Engines which will run for half a century. In the same manner they put into their steel frame construction girders of serviceable quality, but with a much smaller margin for strain than their British competitors.

Wherever they have reasonable expectations of being able to build up a trade both Americans and Germans readily incur large preliminary expenditure; in other words, they are willing to sow liberally in order that they may reap. The real point is that they voluntarily make sacrifices at the outset in order to obtain trade, whereas the British make them at a later stage under pressure of competition, when the concession has lost much of its value. One or two concrete instances will illustrate this. An American manufacturer of agricultural machinery wished to sell a Harvester in the Orange River Colony. He was not content merely to advertise it, but sent a traveler from district to district practically illustrating upon crops the working of the machine, and teaching farmers how to use it, free of charge and without any obligation on their part to buy. In introducing into South Africa the comparatively novel industry of steel skeleton frame construction an American firm not only undertook the work of erection, but supplied an engineer to relieve architects of the labor and responsibility of calculating strains. They said practically, "Send us your plans, and we will work them out for you." The result was that the architects were naturally predisposed in their favor. British manufacturers are now following this lead and are offering exactly the same services, but the Americans have got a most unmistakable start and have occupied the ground. Expenditure of this kind may be wise or foolish, according to the judgment with which it is directed, but the willingness to incur it has secured for Americans the reputation of being both liberal and enterprising.

Americans furnish their customers with far more information than British manufacturers. Their ideas is that manufacturers should create a demand in order to supply it.

Americans excel in their catalogues, which are admirably gotten up and illustrated, and give just the information which is wanted. English catalogues have greatly improved of late and are at least as elaborate as Americans, but buyers complain that they frequently quote in weights and quantities which are not current in the colony, and that, as often as not, they do not state prices, or some important detail. In South Africa trade largely follows the catalogue, and too much care cannot be taken in both text and illustrations to show the purchaser exactly what he will get and what he will pay for it. They are also very skillful advertisers. Both Americans and Germans often send their customers articles of practical value and constant use, representing in some way their manufactures. For instance, a well-known German firm in Johannesburg who deal largely in Trucks and Rails distributed a desk hand blotter, the frame of which was made of metal and fashioned like a double rail line complete with Sleepers and Fish Bolts.

PROMPT DELIVERY.

Great importance is attached in South Africa to quick delivery and strict adherence to contract dates, and there can be little doubt that a considerable amount of trade goes to America and in a less degree to the Continent because manufacturers there can generally deliver more rapidly than the British. This applies more particularly to all branches of engineering, steel work, manufactures of metal, Hardware and Cutlery. Not only do buyers complain, but the representatives of some of the most important British houses in Johannesburg assert that the greatest difficulty they have to contend with in meeting foreign competition is neither price nor quality, but the slow delivery of their firms and their constant failure to keep their promises with regard to contract dates. Repeated disappointments make buyers chary of placing orders with British firms when time is an important object.

THE AMERICAN EYE FOR SELLING POINTS.

The Americans have a very quick eye for what they call "selling points." They deliver Cutlery and small Hardware, such as Steel Tools of all kinds, in strong neat boxes, which look well in stock, and the goods fresh and salable. As has often been pointed out, this is a very important point in up-country stores, where all sorts of goods are kept. The boxes are generally plainly marked with the character, size, &c., of the articles they contain, so that the storekeeper can find what he wants without opening them. In spite of great improvements in this direction, British manufacturers continue to deliver similar goods in paper parcels, or in weakly made boxes, which, as often as not, are broken when they arrive at their destination. In looking over a merchant's stock one quickly becomes able to tell which are American and which are British goods by the superior smartness and neatness of the former.

AMERICAN PACKING.

The Americans have put all their native ingenuity and inventiveness into the art of packing and have brought it to the highest level of care and efficiency. At Port Elizabeth the Commissioner was shown a mixed American cargo of over 5000 tons in which there was hardly a single breakage discovered, although a considerable portion consisted of very fragile goods. The British Hardware manufacturers are very great sinners in this respect.

There are several cardinal points to be observed in packing goods for the South African market. 1. The case and packing should be as light as possible, while efficiently protecting its contents from damage. 2. The objects should be so arranged in the case as not to move about in the process of handling. 3. As freight is charged by cubic feet, there should be no waste of space in the cases. 4. Packages should never be made too heavy and bulky, on account of the difficulty of handling in landing, trucking and delivering. 5. The mode of land transport to the place of destination in South Africa should always be kept in view, so that the size of packages may be adapted thereto, whether it be bullock

wagon, steam trolley or railway truck. 6. Packages should always be fully marked with cubical contents, number, destination, whether in transit or not, so as to facilitate sorting and dispatch at the port of landing.

On all these points the Americans, as a rule, show the greatest care. Their packing of "knock down" furniture is often a marvel of *multum in parvo*. British packers frequently offend against every one of these conditions. They have a peculiarly bad habit of using second-hand cases much too large for their contents, with the result that not only are there heavy breakages, but excessive freight charges for unoccupied space. The most flagrant instance of extravagant and thoughtless packing which came to the notice of the Commissioner was that of a Victoria sent out to Johannesburg with the hood up. The cost of freight to the unfortunate consignee was almost double what it ought to have been.

(To be continued.)

AUSTRALIAN NOTES.

MELBOURNE, November 6, 1903.

THE COMMERCIAL OUTLOOK has recently undergone a change which is characteristically Australian in its suddenness. Where twelve months ago the country was one unbroken stretch of dust and barrenness, the golden wheat is now waving 4 feet high. Reaping operations have already commenced in some of the States. During the past 12 months this wheat producing country has been compelled to import (largely from your Pacific Coast) no less than 350,000 tons dead weight of grain. This was brought about by a very cruel finish to a series of lean years. This is all changed now, and although the harvest is not yet bagged, everything points to a record yield. The Victorian Government Statist, as the result of exhaustive inquiries among cultivators, has published his estimate of the Victorian yield as 26,000,000 bushels. The greatest yield we have ever had before was 19,500,000 bushels. We have about 2,225,000 acres under cultivation, and expect a 12¼-bushel yield.

Taking Australia as a whole (exclusive of New Zealand), the total production will be over 60,000,000 bushels, of which 35,000,000 will be available for export, say 900,000 tons. Freights are ruling low at present, some 130 charters having been effected at from 20 shillings to 22 shillings 6 pence. Taking the low estimate of 3 shillings a bushel, f.o.b. Melbourne, it will readily be seen that the harvest means salvation to the country, while the exchange of bills on London to an approximate amount of £6,000,000 will tend to relieve the present strained monetary position.

The effect locally has been inspiriting, and the month of October has been a fairly good one. Indeed, in one or two instances Hardware houses report the best October for many years past. Harvest Tools have moved with especial freedom, and as stocks are light at present—the natural result of the necessary cautious trading of the recent past—sellers are in the most advantageous position. As the result of the favorable season new areas of land are being put under cultivation and Fencing Wire and Wire Netting are having good sales. The outlook for these lines is distinctly cheering. The market for Plain and Barbed Wire is mostly divided between America and Germany, but the latter has the advantage at present.

THE DUNLOP PNEUMATIC TIRE COMPANY of Australasia, Ltd., held their ninth ordinary general meeting a few days ago. Profits for the year, including £484 brought forward from last year, were £12,428. This concern are rapidly increasing their output, and a steadily increasing demand for Solid Rubber Tires for the wheeled vehicles of Melbourne is one of the chief features of their expansion.

COMMONWEALTH TARIFF DECISIONS gazetted since last advice, and touching lines of American products, are as follows: Electric Searchlights, 12½ per cent.; Dumping Hoops, with holes and rivets, 20 per cent.; Tack Lifters, 20 per cent.; Ferrules, for walking sticks, free; Automatic Soldering Machines, for fitting bottoms on tins, free; Garden Trowels, free; Oil Traction Engines, free; Zinc Plates, cut to size, for electrical purposes, 12½ per cent.; Smoke Tops, or Mantle Protectors for Lamps, 15 per cent.; Master Trees, for Reapers and Binders, free; Reaper Attachments—viz., extra Seat, Reaper Platform and Rake, which can be attached to Mowers, 12½ per cent.; Corn Planters, single row, 12½ per cent.; Burring Machines, for crushing burrs and seeds out of wool, free; Wheels, steel rimmed, for Bogie Carriages for electric cars, 20 per cent.; Pincers, not end cutting, 20 per cent.; Tubes, being an alloy of tin, zinc and antimony, 15 per cent.; Tubes, brass, tinned inside and out, 20 per cent.; Tubes, brass, lined with vulcanite or similar material, free; Saw Ears, with Bolts attached, free; Skips, self dumping, for vertical shafts, 20 per cent.

NEW ZEALAND has gazetted the following decisions: Engines, hot air, free; Hydraulic Lifting Jacks and Carriage Jacks, as engineers' and all metal and wooden workers' machine and hand Tools, free; soldering, welding or brazing compounds, free; Ladles for plumbers' use, free; Pulley Blocks, traveling, 20 per cent.; machine, magneting, for separating iron chips and shavings from brass, free.

JOHN CHAMBERS, founder and head of the firm of John Chambers & Son, Limited, of Auckland, New Zealand, died a few weeks ago, aged 66 years. The firm are among the leading Engineering and Mining Supply dealers in New Zealand.

ELECTRIC LIGHTING is progressing, and the town of Newcastle, New South Wales, will shortly call for tenders for all necessary requirements. Installations of electric power, both for lighting and motive purposes, are being pushed forward on every hand, Australia having hitherto neglected progress in this direction.

THE BUILDING TRADE throughout the Commonwealth is rapidly reviving, and the coming year bids fair to be an exceptionally good one for Builders' Hardware.

SYDNEY HARBOR BRIDGE operations have revealed the fact that it will be necessary to go some 140 feet below the bed of the harbor to secure a rock foundation. Meantime the tenders hang fire, and are likely to.

PRICES OF AMERICAN GOODS.—Complaints are not unknown in connection with the inconsistency of pricing of American goods by manufacturers and exporters, and in conversation with a gentleman to-day this matter cropped up. He contended that merchants and sellers are annoyed when they cannot sell goods to arrive, as last, as it frequently happens that a uniformity of price is not observed by your people, the lists and discounts not being fairly maintained. Of course, market fluctuations must and do occur, and necessarily prices are more or less so regulated; but the changes by English manufacturers of standard lines are not so marked. The matter is one worthy of serious consideration, as most of the houses like to be able to steadily control their business in the regularity of prices, and unless a watch is kept at your end this control is lost, and sellers here are unable to do their business with that certainty which is desirable. Some of the lines being manufacturers' specialties should be so managed that a change should be the exception and not the rule.

AMERICAN EDGE TOOLS are, as usual, well to the front, but some lines, like Chisels (Mortise and Firmer), need a lot of pushing, as the English goods are so well and favorably known. Some of the American Chisels seem to be a little off in either temper or quality, and in purchasing workmen are guided in their purchase by this characteristic chiefly.

COPPER WASH BOILERS of Victorian make are now being handled quite largely, and general impression is that they pay to buy rather than import, as stocks can be easily replaced and buyers are well treated by the makers.

STOCKS AND DIES.—The guides of your cheaper Stocks and Dies will have to receive more attention by your makers, as in many cases they are too light and brittle, though malleable cast. More attention to this detail will give better results, and though adding slightly to the cost, will not affect their sale to any extent. The price of some of these Tools is so very low compared with other makes that possibly the suggestion might apply to the Stock as well as to the guide.

BRAZING CAST IRON.—A cheap and effective means (under various conditions of fracture) of brazing cast iron is needed, and if a really first-class compound, reasonable in price, can be put on the market it should sell well.

THE CLOSET SEATS sent to us are often badly jointed or, rather, part at the joints after some little use. While it is conceded the price is low, it is open to question whether a little better seasoned timber (if this is the main reason) should not be used.

CONSULAR REPORTS ON FOREIGN TRADE.

New Steamship Service Between New York and Antigua.

W. R. ESTES, American Consul at Antigua, West Indies, reports that the Italian Royal Mail Steamship Company have completed arrangements for a regular service every 20 days between Antigua and New York. The steamers will carry mail, passengers and freight, and freight rates will be greatly reduced. While the Quebec line, who also call at that port, has been charging 55 cents a dry barrel, New York to Antigua, the Italian line will charge 35 cents, and the sugar rate to New York will be cut from 13 cents to 9 cents per 100 pounds.

New Steamship Service to Porto Rico.

United States Commercial Agent Joseph Raven of St. Christopher reports that the Royal Mail steamers, formerely running between Barbados and St. Thomas, are to extend their service to San Juan, Porto Rico, making that port their terminus. This change, he notes, will make St. Christopher still more important as a port of call, as it is to be placed in direct communication with Porto Rico and in closer touch with the United States and with Cuba and other islands of the West Indies.

Direct Steam Communication with Cadiz.

The Ceballos line have made Cadiz a port of monthly call. The first steamer has left New York for Cadiz, via Barcelona, Almeria and Malaga, and it is understood that vessels in future are to touch at Cadiz on both the outward and homeward voyage.

Artesian Wells in Brazil.

United States Consul Kenneday, at Para, Brazil, says well boring with American machinery is becoming quite general in that country. Much of this work is constantly going on there and giving complete satisfaction. As the people realize the advantages to be derived from such a water supply, it is expected that it will become increasingly popular and that the business will develop to important proportions.

American Stoves in Brazil.

A steady gain in the importation of light American Cooking Stoves into certain sections of Brazil is reported, and it is believed that the call for these goods will steadily increase as they become better known. The field in Brazil for such articles is very large.

South African Industrial Exhibition.

W. R. Bigham, United States Consul-General at Cape Town, says when the South Africa British and Colonial Exhibition, to be held in the Gardens, near Government House, Cape Town, in 1904 and 1905, was first planned it was decided to rule out all goods not manufactured in Great Britain or her colonies. The promotors, however, have since changed their plans, and it has been decided to open up the exhibition to foreign as well as British and colonial concerns. Fresh plans and prospectuses are accordingly being prepared, and when ready will be sent on application to A. B. P. Baker, secretary, Cape Town, South Africa. The exhibition will probably open in November, 1904, and continue into May, 1905.

MISCELLANEOUS NOTES.

Electric Reading Lamps.

Bradley & Hubbard Mfg. Company, Meriden, Conn., and 26-28 Park Place, New York, have just brought out two new styles of electric light portables, especially attractive for a sitting room, a study or den, or wherever a good reading light is desired. It is furnished complete with silk insulated wire and socket for connection with the house wiring, chandelier, or bracket, the lamp or bulb being secured in the center of shade with wire connection at the top. The shade has what they call a brush copper finish, the material of which is of sheet copper in ornamental form, handsomely finished outside, with a white porcelain lining to reflect the light from the bulb, the shade being supported by a tripod attached to the standard. The outer dimensions of the fixture are: Hight, 18 inches, diameter of shade, 12 inches, with a flat base of metal 8 inches across at bottom, to which the tripod is joined. There is also another portable of the same general character, but somewhat different in details. This company manufacture a large line of light fixtures for oil, gas and electricity, together with a large assortment of art goods, among which are vases, statuettes and various ornamental figures for mantels, &c.

Ideal Powder Measures Nos. 5 and 6.

Ideal Mfg. Company, New Haven, Conn., are offering improved powder measures, as shown in the accompanying cut. The necessity for new powder measures, it is explained, has been brought about by the great variety of smokeless powders, high and low pressure, dense and bulk, &c., which require different sized charges for the various cartridges, from 22 caliber to a 10-gauge shotgun. The No. 5 measure, illustrated herewith, is four measures

Ideal Powder Measure No. 5.

combined in one. The first measures from 2 to 15 grains, the graduations being one grain each. The second measures from 10 to 50 grains, the graduations being two grains each. The third measures from 50 to 140 grains, the graduations being 5 grains each. The graduations on the fourth are in ¼ drachms from ½ to 5 drachms. In measure No. 6 the portion of the right side is the same as in the one illustrated. On the left side there is an additional measure for small priming charges of different powder, the graduations being from 1 to 10 grains, each graduation being for 1 grain. The measures have a close fitting cap or cover fastened with screws. When filled with powder, and the graduated slides all shut and fastened, no powder can escape, it is remarked, however the measure may be carried.

Pipe Wrench Attachment.

The Billings & Spencer Company, Hartford, Conn., are putting on the market the pipe wrench attachment, shown herewith, which is for use on the B. & S. 6 and 8 inch adjustable wrenches. It consists of a serrated tool steel jaw, with a tempered spring attachment, which serves to hold the jaw in place. The attachment is easily removed and can be used for either right or left hand threads by simply reversing its position on the wrench, or, if preferred, by changing the working position of the wrench. This addition to the equipment of these wrenches makes it possible instantly to convert them into pipe wrenches, and can be used on pipe up to and including ¾ inch in diameter.

Pipe Wrench Attachment.

The New Chicago Electric Freezer.

The Horizontal Freezer Company, Chicago, have placed on the market their new freezer, geared direct to

The New Chicago Electric Freezer.

a 2 horse-power electric motor, rigidly supported on freezer frame. The motor is made by the Western Electric Company, is of the direct current type and completely encased and provided with removable covers. From the illustration it will be seen that the motor rests on a bracket which forms a solid casting with the upright, giving greater security than if bolted in place. The machine with motor complete weighs about 1000 pounds, and makes 40 quarts of ice cream at a time. The manufacturers state that the saving in labor and time effected by the motor driven machine will more than pay for the difference in its cost. The direct attachment of the motor to the freezer does away with belts and pulleys and effects a great saving in floor space as compared with machines that are actuated by separate motors. The details of the freezer itself were described in *The Iron Age* of January 29, 1903.

Genuine Buckeye Pruner.

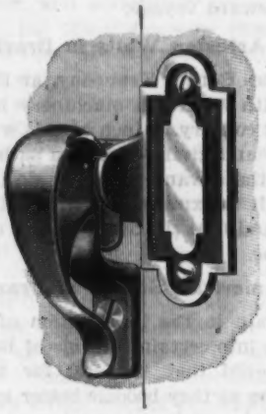
The accompanying illustration represents a pruner, in using which the operator grasps the limb with the hook and cuts toward him, bringing the maximum strain nearest the pivot, it is explained, thereby performing the work with great ease. It is pointed out that this pruner operates directly opposite to the ordinary shear blade pruner, which commences to cut near the pivot and pushes the work from the operator like a common pair of shears. The steel blades of the pruner illustrated are hand forged,

Genuine Buckeye Pruner.

and it is offered by the Novelty Mfg. Company, Jackson, Mich.

Automatic Cupboard Door Catch.

The Universal Fastener Company, Cleveland, Ohio, are putting on the market the door catch shown in the accompanying cut. In use, as the door is pushed shut the pendant handle slides into the holder. Among the points of excellence the following are mentioned: That the catch is positive in its action; that it is never out of order, and that it adjusts itself to shrinkages of the wood work. The catch is designed for use in residences, apartment houses, stores, libraries, &c. The catches are packed attractively, each catch in a paper box with screws and a card template, so as to be convenient for both seller and buyer.



Automatic Cupboard Door Catch.